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COMPUTERWORLD

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News Round-Up

CCPA Again OKs Program Patent

By Don Leavitt
Of the CW Staff

WASHINGTON, D.C. — In a 3-2 decision, the U.S. Court of Customs and Patent Appeals (CCPA) again reversed the U.S. Patent Office and ruled software is eligible for protection as an invention under existing law.

The decision last month covered the "Regulator" program invented by Glen F. Chatfield, president of Duquesne Systems, Inc. of Pittsburgh. Regulator monitors and modifies the flow of user programs in a multiprogramming environment through dynamic changes in program priority assignments.

The Patent Office has 90 days to appeal the finding to the U.S. Supreme Court, but it has not yet decided what action it will take, Solicitor Joseph F. Nakamura indicated last week.

Although not directly related to the case, the transition from a Ford to a Carter administration may nonetheless affect both what the Patent Office does and when it acts, according to one observer. The Commissioner of Patents is a political appointee and the current commissioner is therefore a "lame duck," he explained.

In the majority opinion on the Chatfield case, CCPA Chief Judge Harold T. Markey recalled precedents, including the Benson-Tabbot case in 1972 and the Johnston case earlier this year [CW, April 5] in which the Supreme Court heard appeals from the Patent Office and upset CCPA findings in favor of software inventors.

(Continued on Page 4)

U.S. Slashing IBM Witness List

By Catherine Arnst
Of the CW Staff

NEW YORK — The finish line is in sight for presentation of the government's antitrust case against IBM here — a job which has taken approximately 154 court days so far.

Government attorneys, "apparently satisfied they have put a very strong case into the record," have begun to slash their witness list, a Justice Department source said.

With the cuts made to date, a June 1977 conclusion seems plausible, he added.

The government's original witness list, submitted to the court on Sept. 19, 1975, contained 107 names. On July 15, 1976 — nearly 10 months later — only 31 of those had testified and some observers were projecting the Justice Department would take two or three more years to get through the entire list.

However, the pace of the trial changed considerably after July. Until then, the court had been sitting four hours per day, four days per week and most of that time was filled with documents being read into the record.

In September, the court shifted to five hours per day, five days per

(Continued on Page 3)

Government Modeling Efforts Hit

By E. Drake Lundell Jr.
Of the CW Staff

WASHINGTON, D.C. — Lack of management planning, commitment and control is costing the U.S. taxpayers millions of dollars in unnecessary development costs for computer models used by the government, according to a recent General Accounting Office (GAO) report.

"Although successfully developed models can be of assistance in the management of federal programs, GAO found that many model development efforts experienced large cost overruns, prolonged delays in completion and total user dissatisfaction with the information obtained from the model," the report concluded.

At the same time, however, the GAO said "a minor investment" in the development of guidelines and standards for such systems "could save the government millions of dollars in model development costs and make modeling a more efficient and effective tool for managing federal

(Continued on Page 5)

Despite Antitrust Action

Carter Eyeing IBMers for Cabinet

By E. Drake Lundell Jr.
Of the CW Staff

PLAINS, Ga. — As the slow and deliberate Cabinet selection process continues here, it appears likely a significant part of the incoming Administration will be drawn from a group of people with close ties to IBM — even while the government continues to prosecute an antitrust suit against the firm.

It now looks as though three or possibly four Cabinet posts in the Carter Administration will be filled by those with IBM links. And they are some of the most important — State, Defense and Commerce.

In addition, President-elect Jimmy Carter's top science and technology advisor is drawn from the ranks of IBM.

Furthermore, much of Carter's input from the business community is coming from those with close IBM ties.

Cyrus Vance, named two weeks ago to be Secretary of State, is a member of the IBM board of directors.

Harold Brown, president of the California Institute of Technology, is the front runner for the position of Secretary of Defense. He is also an IBM director.

Jane Cahill Pfeiffer, interviewed here last week for the Commerce Secretary's slot, is a former vice-president for communications at IBM and is married to Ralph A. Pfeiffer Jr., presently senior vice-president at IBM.

Another IBM director being considered for a Cabinet slot is Patricia R. Harris, a black lawyer. Her name has not been mentioned for any specific post, but it keeps popping up in the discussions on the staffing of the new Administration.

Dr. Lewis M. Branscomb is said to have the President-elect's ear on science and technology and may wind up as the science adviser to the President when he takes office on Jan. 20. Branscomb is an IBM vice-president and chief scientist for the firm.

Carter Meets With Cary

The Carter business adviser most connected with IBM is Frank T. Cary, IBM chairman of the board, who met with the President-elect in Washington, D.C., last week.

In addition to Cary, Irving S. Shapiro, chairman of E.I. du Pont de Nemours & Co., has been giving Carter advice on business matters. He is also a member of the IBM board of directors.

For years IBM brass has pursued a policy of supporting both Republican and Democratic candidates for President, but it appears the payoff could be greater from this election than from any before — with the possible exception of the election of Dwight Eisenhower in 1952.

One of Eisenhower's greatest supporters was Thomas Watson Sr., then chairman of IBM, who helped land the presidency of Columbia University for the ex-general and who then supported his Presidential campaign.

In 1954 the Justice Department negotiated what was seen by many as a weak consent decree in an antitrust suit filed against the firm by the outgoing Truman Administra-

(Continued on Page 6)

Diffused Power to Scatter DP Responsibility: Glaser

By Ronald A. Frank
Of the CW Staff

HILTON HEAD, S.C. — Distributed data processing will significantly change the way non-DP persons operate within a corporation, according to consultant George Glaser.

Speaking at a conference on distributed DP held by International Data Corp. here last week, Glaser said DP managers must be prepared to decentralize the DP management functions along with the hardware.

"I doubt any organization can limit its venture into distributed DP to hardware only. Once the hardware is in the hands of the users and they become accustomed to having it available, they will want still more devices, more processing power and more staff," he predicted.

DPers Must Adjust

The cost of such "organizational dislocations" will be high, and the DPers who cannot adjust "will fall beneath the wheels of progress," he said.

The intelligent DP manager knows distributed DP will diminish his influence; for this reason, a company cannot rely only on DPers in making the decision on whether to decentralize, he cautioned.

The trade-off is between centralization — which means order — and decentralization — which means freedom, he said, adding the solution will be a balance between the two.

It is to be expected that the pendulum will swing back and forth as the various benefits are considered, Glaser said.

Distributed DP will put computing power into the hands of those who have the problems to solve. As a result, needs should be assessed more realistically and costs should be under more visible control, Glaser said.

However, there are disadvantages, he warned. Among them are technical problems.

The configuration of distributed systems "will challenge the skills of even the most experienced or-

(Continued on Page 3)

Ex-HEW Official Charged With Writing MMIS Bids

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — One of three federal officials responsible for reviewing and certifying state plans for automated Medicaid systems allegedly accepted more than $8,000 in checks and services from a contractor of those systems, the Senate Subcommittee on Investigations learned here recently.

Charles A. Cubbler received the money and a 1975 Chrysler Cordoba from FMS Management Services, Inc. for writing and editing proposals for Medicaid Management Information Systems (MMIS), staff investigators told the subcommittee.

Cubbler, acting director of Medicaid systems in the Department of Health, Education and Welfare's (HEW) Office of Information Systems (OIS) from Aug. 8, 1974 until April 21, 1975, then participated in the federal decision-making process that resulted in contract awards to FMS in West Virginia and Maryland, the investigators said.

The MMIS program, which costs taxpayers $1.5 billion annually, will probably provide the foundation for the processing system needed for any type of national health insurance program [CW, Nov. 29].

The report on Cubbler's activities was part of an overall review of the MMIS program being conducted by subcommittee investigators David Vienna and Walter S. Fialkewicz.

HEW is also looking into "possible irregularities" in Cubbler's actions, a spokesman there said. HEW's investigation is being conducted "in consulta-

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Suit Charges Federal Commission Fails To Protect Trade Secrets Held on Tape

By Catherine Arnst
Of the CW Staff

WASHINGTON, D.C. — The U.S. Consumer Product Safety Commission (CPSC) gives insufficient protection to manufacturers' trade secrets it stores on computer tape, a suit filed here has charged.

The Chemical Specialist Manufacturers Association, Inc. (CSMA) brought the action after the commission turned information on manufacturers' formulas over to Auerbach Corp. for processing and storing on computer tape.

CSMA has complained the commission had no internal security regulations to safeguard this information and, more seriously, had no regulations on the security responsibilities of outside contractors, according to Steven Kellner, director of legislative and regulatory affairs for the CPSC.

CPSC requires manufacturers to turn over product formulas as part of its work to protect consumers from harmful materials.

The association wants CPSC to publish regulations in the *Federal Register* and then allow time for comments on them. In a pretrial hearing, Judge Bennington Parker expressed displeasure with the commission for failing to follow that procedure.

Since then, the agency has published regulations it claimed already existed in unwritten form in the *Federal Register*, but no time was allowed for comments, Kellner said.

'Woefully Inadequate'

The deposition of a consultant, Eric Novotny, was introduced by CSMA as expert testimony. Novotny said he looked at several documents used by CPSC for security purposes and found the procedures "woefully inadequate."

Some of the language was unclear and security controls on outside contractors weren't as stringent, he said. "An audit trail cannot detect the damage because the information does not have to be tampered with," he explained.

But the CPSC believes the Federal Criminal Code is adequate protection since it prohibits employees from disclosing this information, according to Edward Cull, general counsel for the commission.

There have been no accusations of breaches of security since the commission obtained the trade secrets, which is proof the regulations now in use are adequate, Cull claimed.

Auerbach already has top secret clearance from the Department of Defense and the firm's physical plant was visited by CPSC members to ensure it met security standards, he added. Also, CPSC required any persons coming in contact with the data to sign affidavits on their background.

Auerbach had the trade secret information for 16 months; during that time it was processed and stored on computer tapes that have since been returned to CPSC.

Those tapes are tightly guarded and the whole set must be obtained by anyone who wants the information contained on them; one tape by itself is useless, Cull said.

Even though no breaches of security have been discovered, that doesn't mean they haven't or won't occur, Novotny said. "There are as many if not more motives there than financial embezzling. An individual could divulge the trade secrets for moral reasons because he does not approve of a product," he said.

Both sides have filed motions for summary judgment — a request that the judge rule on the facts of the case without a trial. Kellner expects a hearing on those motions soon and thinks Parker will make a summary judgment, he said.

Users Rebuked for Not Assessing Costs of Installed Applications

By Ronald A. Frank
Of the CW Staff

HILTON HEAD, S.C. — Only one in 10 users today is evaluating the cost benefits achieved by a DP application after it is implemented, according to John F. Rockart, director of the Sloan School Center for Information Systems and Research at MIT.

Rockart told a conference on distributed data processing here last week that increased project evaluation is needed to keep track of the cost benefits actually obtained from applications.

As distributed DP takes hold, it will be more difficult to perform this type of evaluation because of the dispersed locations involved. But many of the centralized vs. decentralized trade-offs must be made in relation to the DP pricing involved, Rockart said.

Most systems are built today "from the transaction up," he pointed out, but there is an alternative which is based on configuring DP needs from the management decision down.

The latter "decision support" approach would apply to such applications as cash management and portfolio management, he said.

Three major trends are currently being seen among major DP implementations, depending on their requirements. These are centralization toward one large site, which is being done by Martin Marietta and others; decentralization to dispersed sites; and a return to a more centralized DP operation from a heavily decentralized operation.

In the third category Rockart listed such firms as Du Pont and Corning Glass.

Stressing there is no one correct way for a DP implementation to go, Rockart said the proper solution must be based on application analysis and especially the implication of that approach to DP management. In many cases, the cost segment of the decision is based on software creation and management because the cost of hardware is no longer a prohibitive factor.

Certain types of applications appear to lend themselves to operational patterns, he added. Accounting tends to be run with both centralized software and hardware; order entry often has centralized software which is run on decentralized hardware.

In manufacturing, both hardware and software tend to be decentralized, Rockart said.

As a general rule, most batch-oriented applications are centralized while on-line jobs are run in decentralized mode, he noted.

The trend toward more hardware decentralization is based on increased process control types of applications in which a remote processor gathers data and builds a local (remote) data base where the data is being monitored, Rockart said.

Other reasons for this decentralization are lower cost hardware, increased on-line applications and decision support-type systems where data is collected to support management in taking specific actions, he added.

Correction

In the story on the U.S. vs. IBM antitrust trial's journey to Miami [CW, Dec. 6], the IBM attorney should have been identified as Robert Mullen and the Justice Department attorney as Charles Hamilton III.

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FCC Will Play Part in AT&T Antitrust Trial: Judge

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — Federal Judge Joseph C. Waddy and the Federal Communications Commission (FCC) will try the U.S. government's antitrust suit against AT&T hand in hand.

Stifled by jurisdictional questions within three months after its filing in November 1974, U.S. vs. AT&T began moving forward again when Waddy ruled from the bench last month that the U.S. District Court here does have the right to hear the case [CW, Nov. 22].

In a later written opinion clarifying his oral ruling on why the FCC, as Bell's regulator, shouldn't hear the Justice Department complaint, the judge said AT&T and its codefendants in the suit "do not have blanket immunity from antitrust liability" even if they are regulated under a "pervasive" scheme established by Congress with the Federal Communications Act of 1934.

Antitrust Jurisdiction

The antitrust laws still can be applied to the telephone company, Waddy maintained in his memorandum. "The court is satisfied that it has antitrust jurisdiction of at least some of the aspects of the case," he said.

At the same time, he conceded that "some — or much — of the conduct and practices" of AT&T on which the Justice Department bases its telecommunications industry monopoly charges might well fall under the watchful eye of the FCC.

"The court, in its discretion, will in the future consider referring particular issues to the commission at the appropriate time," he said.

Justice Complaint 'Vague'

In addition, at this stage of the suit's journey to trial, "the issues must be more sharply defined" through exchanges of documents, interviews with prospective witnesses and other procedures permitted under federal rules for civil cases, the judge noted.

The court agreed with AT&T that the Justice Department complaint is "vague," but added its failure to describe specific acts that support the contention that AT&T is a monopolist doesn't warrant dismissal of the case.

Justice Slashes Witness Roster

(Continued from Page 1)

week and documents were entered into the record without being read in the open court. This change in procedure almost doubled the speed at which attorneys could present their case.

Evidence of the accelerated pace can be found in the transcript page count. On July 15, 1976, after 14 months of trial, there were 22,319 transcript pages. Four months later, on Nov. 15, the count stood at 32,449.

In August, the government presented an updated witness list containing 60 names to the court. Although only four of those witnesses have testified, the list has been cut by approximately 24 names.

Thirteen witnesses were deleted in the financial portion of the government's presentation while the testimony of several other witnesses has been stipulated to by both parties.

In addition, 11 government personnel who helped prepare the case may be called to the stand if IBM requests it. No decision has been reached on that matter yet.

As the case stands now, three Memorex Corp. witnesses will appear next: Laurence Spitters, former president and chairman of the board; John Navas II, manager of resource planning; and Thomas E. Gardner, disk subsystem development manager.

They will be followed by witnesses from Storage Technology Corp., California Computer Products, Inc. (Calcomp), Cambridge Memories, Wang Laboratories and Advanced Memory Systems.

The court still must plow through a considerable number of documents — more than 500 will be offered in the peripherals case alone, according to government estimates.

In addition, decisions must be made on about 1,000 claims of privilege made by IBM.

Nevertheless, government attorneys are confident they will be able to tie up all these loose ends by June and some are even predicting a closing date in May.

Glaser Sees Diffusion Of DP Responsibility

(Continued from Page 1)

ganizational designers. And some technical specialists will leave due to the diminished role they will play," Glaser said.

Not all firms should adopt decentralized DP, but if a company operates under a management philosophy that encourages dispersed responsibilities, it should also consider distributing DP, he said.

Classic problems such as security, privacy and career paths will all become more complex when distributed DP concepts are adopted, Glaser warned. As long as the system fits the needs of the company, it may be worth the extra effort, he said.

With decentralization, CPU utilization will go down. There also will be some duplication of effort as local staffs grow in size and cost and the influence of the corporate DP staff diminishes.

"But I'm willing to accept all of these results to make it easier for those who have the problems to get their hands on the tools to solve them," he said.

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Ex-HEW Official Cited for Writing Firm's MMIS Bids

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tion" with the Department of Justice.

Cubbler's attorney, George Frampton of Rogovin, Stern and Huge here, said Cubbler doesn't think it would be appropriate to comment on the substance of the subcommittee hearings at this time. However, the former HEW official may testify on the matter if called upon, Frampton said.

In their presentation to Sen. Sam Nunn and his subcommittee, Vienna and Fialkewicz also voiced fears that contracts for MMIS, which receive 90% federal funding for system design, development and installation if approved and 75% for operating expenses if certified, aren't competitive enough.

Francis J. Melly, president of FMS, told the investigators "that Cubbler wrote parts of and 'edited' FMS's West Virginia proposal and that he simply edited the Maryland proposal," they said.

HEW records show that at the same time, Cubbler was one of three certifying officials responsible for approving systems slated to receive 90% of their development costs from the government.

While Cubbler was not the only person involved in the decision to award FMS with a $460,270 contract for the West Virginia MMIS, he was the only advocate of a $133,890 supplement to that contract, the investigators said.

The supplement to the contract between West Virginia and FMS was approved over the objections of OIS officials and staff, the investigators stated. Many objected to this supplement because it would duplicate federal funding of systems work on the evaluation and tracking of nursing homes and their utilization already under way in Utah.

"Cubbler was in a position to know exactly what HEW would want to see in any proposals that would be approved. Indeed, it was his job as a government employee to tell states what HEW expected," the investigators said.

FMS' Melly told the subcommittee various payments were made to Cubbler for consulting services in connection with the West Virginia, Maryland and Civilian Health and Medical Program for Uniformed Services (Champus) requests for MMIS bids.

The dates of these checks are interspersed with those of conferences for companies which wanted to bid on the West Virginia job and later on the $299,800 Maryland contract. The stubs in Melly's checkbook indicate "D.C. Chambless" — Cubbler's wife's maiden name — was paid for "West Virginia professional fee," "Maryland proposal," and "consulting services Champus proposal," the investigators reported.

Shortly before FMS received the extension on its West Virginia contract and months before it acquired the Maryland job, FMS gave Cubbler a Chrysler Cordoba for his personal use. The car was to serve FMS in the event the company opened a Washington office to serve the Champus program, according to Melly.

FMS was not awarded this contract, however. The Washington office idea was dropped and Cubbler simply was allowed to keep the car, Melly told the subcommittee investigators.

Concern Over Texas

In addition to its concern that contracts for MMIS aren't sufficiently competitive, the Senate Subcommittee on Investigations is examining certification of "fragmented" or multiple computer systems to handle Medicaid claims processing in a state. Duplicate systems duplicate federal costs,

HEW recently certified such a system in Texas, however, and Cubbler, then detailed to the OIS' Office of Systems Planning and Evaluation, appears to have had a hand in the process, the investigators reported. Exactly what that role was is uncertain, they told the subcommittee.

Attorneys for Melly informed the Senate subcommittee staff that Cubbler advised FMS of the subcommittee inquiry perhaps as early as last March, the investigators said.

"Melly told the subcommittee staff that Cubbler told him to destroy all checks the company had paid him and that Cubbler directed Melly to change all expense vouchers for entertainment by deleting his — Cubbler's — name," they told the subcommittee.

"Melly did not destroy the checks but did ask his Washington representative to send in amended expense vouchers," the investigators reported.

"When the subcommittee subpoena was served in July on Melly, he surrendered the checks and the actual, unamended expense vouchers. Subsequently, in an expression of good faith and cooperation with the subcommittee inquiry, Melly, through his attorneys, revealed the Cubbler directives and he provided to the subcommittee the altered expense vouchers with names substituted for Cubbler's name," they said.

CCPA Reverses Patent Decision

(Continued from Page 1)

In the former case, the high court limited its decision to the algorithm invented by Benson and Tabbot rather than encompassing all software, Markey said. The narrow nature of that decision was reemphasized by the Supreme Court when it threw out the Johnston claim on the grounds of obviousness and specifically refused to rule on the general patentability of computer programs, he added..

In the Chatfield situation, "no prior art was cited [by the Patent Office] against the appealed claims and, accordingly, [the] invention must be considered to have been new and unobvious," the judge continued, clearing that challenge.

"Although Chatfield's method of operating a computing system adjusts priorities of computer programs, no processing program, by itself, is claimed," he said.

Because any algorithms used in Chatfield's method "only guide the flow" and do not change the logic of programs being executed, "the issue is not whether a computer processing program, claimed in 'method' terms," is patentable under current law, Markey added.

Defined as a "method of operating a computer system," Chatfield's invention falls within the scope of the Patent Act which allows "process" claims: "method" and "process" have been deemed synonymous in earlier court rulings, he noted.

In particular, he added, the claim is not based on "mathematical problem-solving algorithhms" or on "purely mental steps," either of which would make it ineligible for patent protection.

Chatfield's application listed some algorithms which may be used in carrying out intermediate steps in his process. Although these might seem to fall in the prohibited area, "no formula or algorithm appears in the inventor's primary claim."

Therefore, Markey ruled, the invention, taken as a whole, is patentable.

In a dissenting opinion, CCPA Judge Giles S. Rich argued against the narrow interpretation of the Benson-Tabbot decision. Clearly upset with the ambiguities in that 1972 ruling, he noted the Supreme Court stated at the outset of its opinion that "the question is whether the method described and claimed is a 'process' within the meaning of the Patent Act.

"But nowhere in the Benson opinion have I ever, after many attempts, been able to find an express answer to 'that question . . . therefore I have turned to the . . . contentions that we erred in holding [those] claims" patentable, Rich said.

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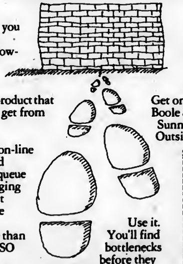

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Says Private Sector Could Do Better Job

OTP's Houser Believes 'Fed' Shouldn't Control EFT

By E. Drake Lundell Jr.
Of the CW Staff

NEW YORK — The Federal Reserve System should neither dominate nor control the developing national electronic funds transfer (EFT) system, Thomas J. Houser, director of the White House Office of Telecommunications Policy (OTP), told the American Bankers Association meeting here recently.

"There are reasons for believing private organizations can carry out all the transmission functions of the Federal Reserve payments system and do the job with reliability, security and at a lower cost," Houser said.

But "the Federal Reserve continues to expand its operational role in interbank EFT" in spite of previous objections by the OTP and others, Houser noted.

Presently, the Federal Reserve has instituted "pilot projects" linking various automated clearinghouses, he said.

"We are told this is an 'evolutionary' step, but the end point of the evolution appears to leave the Federal Reserve dominating all payments activities in the economy," Houser claimed.

While the Federal Reserve "needs to know about the net activity of the U.S. payment system," Houser said this "is definitely not a sufficient reason for ownership and control of the facilities at an artificial heart of the system."

'Cause for Concern'

There is "cause for concern" when officials of the Federal Reserve "pledge willingness" to comply with possible recommendations of the National Commission on EFT while, "in the interim, the back offices of the Reserve banks and the Reserve system continue to design and implement EFT systems" which are not sanctioned by the national commission, Houser warned.

"If we wish to ensure the robustness of a transaction system, then we do so by [the] decentralization and designed-in redundancy" that comes with privately run systems, he contended.

"As we race to automate and 'rationalize,' it is worth reflecting upon the healthy distrust of a big centralized system which has given us over 14,000 banks today and the strongest — but not most convenient — financial system in the world," he added.

"To the vast majority of Americans, big centralized systems mean either New York or Washington and a continual erosion of localism and individuality," he said.

Federal Modeling Efforts Hit

(Continued from Page 1)

programs."

"Although the government's total investment in computerized models cannot be determined," according to the report, it is clearly in the hundreds of millions of dollars. The Defense Department alone spent more than $172 million on such models in 1970, the GAO said.

In order to study the problem, the GAO identified 538 federal agencies or contractors in the Pacific Northwest area of the U.S. using 519 computer models that cost about $39 million to develop. It looked in detail at 57 models that cost $21 million in development.

Lack of governmentwide standards and guidance for developing such models "was a factor directly contributing to the large problems experienced while developing 33 of these models," the GAO said.

"These problems resulted in cost overruns, delays in developing the models and user dissatisfaction with the information produced by the model," the agency added.

"Cost overruns totaled about $1.1 million to make some models responsive to user needs. Some development cycles were delayed up to four years beyond their original and revised completion dates.

"In some instances managers would not use the information obtained from the model because they were displeased with its reliability. The cost to develop those unsatisfactory models totaled about $1.6 million," the report stated.

Problem Causes

All of the problems were attributable to lack of either management planning, management commitment or management coordination, according to the GAO.

In the area of planning, the congressional watchdog agency said:

- "Management did not clearly define the problem to be modeled; thus, the developer had to guess what had to be modeled."
- "The developer was not able to obtain the data needed to make the model function."
- "Management allocated insufficient funds to complete the model."
- "Management did not make workable provisions for updating the model for future use; thus, the model soon began to provide outdated information."
- "Management did not make provisions for evaluating the model."
- "Management did not clarify documentation requirements for the model. As a result, only the developer understood how it worked and the relationships maintained by the variables incorporated into it."

A lack of management commitment was evidenced by the fact management did not actively participate in planning models and by the fact management did not understand the techniques and applications of computer modeling.

Furthermore, lack of coordination was shown in many cases when management did not monitor the model development effort on a continuous basis, allowing efforts to continue after they should have been terminated, the GAO said.

In order to overcome the problems encountered with the models, the GAO called on the Secretary of Commerce to "formulate" governmentwide standards pertaining to development and procurement of computerized models."

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WANG

Despite Current Antitrust Suit, Carter Eyeing IBMers for Posts

(Continued from Page 1)

tion.

Watson's sons — Tom Jr. and Arthur — were both active in supporting political figures and campaigns. Thomas J. Watson Jr., who ran IBM from May 1956 until June 1971, was said to be particularly active in Democratic affairs while Arthur, who headed IBM World Trade until he was named ambassador to France by ex-President Nixon in 1970, contributed heavily to the Republican party, donating $300,000 to the 1968 Nixon effort.

T. Vincent Learson, chairman of IBM before Cary took over that position in 1973, also apparently backed Republican candidates. He is said to have seriously considered an ambassadorship or Cabinet post in the latter days of the Nixon administration, but declined because of the Watergate scandal.

However, he became the U.S. representative to the Law of the Sea conference at the request of Gerald R. Ford.

The historical record hardly shows a time when three or four cabinet posts were occupied by people with close ties to IBM, as could happen in the Carter Administration if those currently being considered for jobs actually land them.

And, meanwhile, the Carter team will have to make important decisions about how vigorously the government's case against the corporation will be pursued — or whether in fact it should be settled even at this late date by a consent decree.

But while it is rare for IBMers to land a wide variety of sensitive Cabinet posts that could affect the future of the firm, the reverse is not true.

In fact, high-level government personnel, particularly from the Justice Department and the federal scientific establishment, have steadily made their way to IBM when their terms of government service were over.

The most notable have come from the Justice Department, and in fact the two most recently hired legal counsels for IBM both served as U.S. Attorney Generals — Burke Marshall and Nicholas deB. Katzenbach.

Katzenbach, who was Attorney General under Lyndon B. Johnson, is now defending the firm against a lawsuit filed by his successor, Ramsey Clark.

Lewis Branscomb, who now is helping the President-elect formulate science and technology policy, was a director of the National Bureau of Standards before he joined IBM in 1972. He is one of the few IBMers who may make the move back from Armonk to the shores of the Potomac.

And while the Cabinet posts will give IBMers a high visibility in Washington, that does not really reflect the full influence the firm may have in the Capitol.

IBM is number seven on the list of companies that have contributed personnel to governmental advisory committees — there are 45 IBMers on one committee or another advising the government.

AT&T, which is also embroiled in a lawsuit with the government on antitrust grounds, leads that list with 130 of its employees on government committees.

And John deButts, AT&T chairman, is also advising Carter on the business scene.

Dear Whom?

PETOSKEY, Mich. — A national news magazine that shall go nameless recently sent out a computer-printed mail offer of a half-price, lifetime subscription to "a few carefully chosen persons."

The offer arrived at the Emmet County Jail addressed to "Mr. Emmet C. Jail."

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Dr. Franklin F. Kuo, Assistant Director DDTACCS (ADP/Teleprocessing)

And, there are many more. Including representatives of Government agencies who will fill you in on legislative and regulatory matters every datacomm user should know about. For more information on this annual Conference and Exposition, write DataComm 77, 60 Austin Street, Newtonville, MA 02160. Or call (617) 964-4550 collect.

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DPMA Poll Finds Privacy Still Most Critical Issue

By Ann Dooley
Of the CW Staff

CHARLESTON, Ill. – Privacy was rated the most critical issue facing the DP industry in an Education Foundation survey of 4,000 Data Processing Management Association (DPMA) members conducted here recently.

The rights of individuals, security of files, costs, the need for defined state and federal guidelines and the determination of who should define such questions were concerns mentioned by respondents who ranked privacy first in a list of 39 critical issues.

Of the 2,900 submitted comments relating to these issues, 15% listed some aspect of the privacy problem.

Education was ranked the second most important issue by 10.8% of the survey respondents. Their concerns included accreditation, curriculum standardization, entry-level requirements and the need for definition of a common body of knowledge of DP.

Also cited was the need for continuing DP education and DP education for end users, the general public and top management. Cross-department training and DPers trained in the business of the employer were also stressed.

'Adamant' About Education

The survey respondents "were pretty adamant about that," according to Roland Spaniol, president for the board of regents for the Education Foundation.

"They felt there was a problem of their work not being appreciated and that was because users didn't understand computers and DPers didn't understand their industry," he explained.

Standards, cost effectiveness and security were ranked as the third, fourth and fifth most serious issues respectively for the industry. Those mentioning standards wanted everything in DP standardized, including languages, hardware, software, data communications, terms, vendors, performance and forms, Spaniol said.

"I was amazed at what people wanted to standardize," he said. "I'm not sure the industry is ready for that much."

Pleased With Answers

Spaniol said he was pleased with the answers. "Knowing you're sick is part of the problem of improving yourself.

"People are working on the problems, but they're not organized." Problems won't be solved until the individual, the professional societies, industry and the government work together to find solutions, he said.

"The results were pretty much as I expected but I thought more people would be interested in social impact and the part DP plays in our lives," Spaniol said, adding he also expected DPers to be more interested in certification and licensing, which were ranked 10th and 24th.

"Disaster planning was rated 37th out of 39; I guess people aren't concerned about that anymore," he said.

The purpose of the survey was to focus on what should be happening and what needs to be done in the industry, according to Spaniol.

Auto Chase, Search Ends With NCIC Hits

TYLER, Texas – Officers of the County Sheriff's Patrol were checking a Pontiac Trans Am with Missouri license plates here recently when the occupants drove away at a high rate of speed.

After an extended vehicle chase and terrain search involving several patrolmen, the occupants were located and detained while checks of the Federal Bureau of Investigation's National Crime Information Center (NCIC) were made through the Texas Crime Information Center.

"Hits" were received on all three individuals and the car, NCIC officials said.

A stolen vehicle record for the car had been entered in the Missouri Uniform Law Enforcement System (Mules) and NCIC earlier that day. The other NCIC hits showed one individual was wanted for strong-arm robbery, the second was wanted for auto theft and the third was the subject of a missing person search.

The three individuals were held by the County Sheriff's Office on local narcotics charges and appropriate detainers were placed.

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FAA Admits Shortcomings Of RDP Tracking System

By Ann Dooley
Of the CW Staff

INDIANAPOLIS — Federal Aviation Administration (FAA) officials admitted before a congressional hearing here recently that there are serious problems with the radar data processing (RDP) system at 20 FAA air traffic control centers across the U.S,

Outages have occurred frequently in the computerized system, forcing air traffic controllers to switch to manual backup systems [CW, Sept. 20]. The controllers have locked horns with the FAA over the continuing problem.

"Allegations have been made that system interruptions pose a hazard to aviation safety. This is simply not the case," Warren Sharpe, director of the FAA's Airways Facility Service, testified before the House Government Operations Committee's Government Activities and Traffic Subcommittee.

But a spokesman for the air controllers gave a different view. "With no warnings at all, you are battling the element of surprise. Abrupt confusion takes hold of your mind as you immediately turn toward preventing the ultimate disaster — a mid-air collision," Jim Logan said..

Those who are "unversed" in the system's technical aspects might see the problem as more severe than it actually is, Sharpe indicated. "The system was designed to accommodate interruptions without derogating safety," he said.

"The people who make these determinations sit in Washington or regional offices and are so far removed from the actual separation of aircraft that they could hardly be considered experts on the matter," Pete Foltz, another controller, responded.

Valuable But Imperfect

While Logan and Foltz agreed the RDP system is a valuable aid, they insisted it still has a long way to go. The outage problem has been with the system since it began, Foltz pointed out.

But "we are not aware of any possible way in which unscheduled interruptions can be reduced to zero," Sharpe said. "This is just not technologically feasible with so complex a system upon which so many demands are placed."

Controllers complained that confusion and tension occur whenever a transition to the manual backup system has to be made.

"There is approximately a 45-second to 5-minute time lapse while making the transition from narrowband to broadband. This can result in a situation out of control.

"This time lapse is directly proportionate to the traffic volume and degree of complexity when the failure occurs. A situation such as this becomes more than a control problem; it becomes one of survival," Logan warned.

"Up to the present, 'Lady Luck' has been with the controllers and the flying public. But what happens someday when she's overlooking Los Angeles and doesn't have time for Indianapolis?" he asked.

"The FAA came in with what it thought was a locked-up case," Dave Lakin said. Lakin is press secretary to Rep. David Evans (D-Ind.), who sponsored the hearing.

While the FAA argued during the hearing that safety remains constant although efficiency might vary, the controllers maintained that when efficiency goes down, so does safety, Lakin said.

The FAA eventually admitted to shortcomings in the RDP system, however, and discussed changes and planned improvements, according to Lakin.

"We have increased the emphasis on reducing system interruptions and will continue to stress management awareness of the problem," Sharpe said.

A new backup system known as the Direct Access Radar Channel (Darc) is being planned and will be ready by 1978, he said. The Darc system will be similar to the existing main system and will be a great improvement over the manual backup now in use, he added.

Ten Terrifying Questions to ask a person trying to sell you a computerized personnel/payroll system

Terrifying question number one
OK, so we're sold on using a system—who's going to install it? Are you equipped to do it? Can you get it up and running fast? Are experts on hand who have done it before? Will you give us tender, loving care while you install our new system? Will we get good support after we're up-and-running?

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Terrifying question number two
Will the system's value exceed its cost? Can you prove it? Exactly where will savings come from? How will costs be cut? Can you give us figures showing savings in time, money, and better use of our staff?

Terrifying question number three
What's your track record? How many systems are actually in operation? Do your users boast about the system? Are they happy? Will they pass on the good news? Is there any good news?

Terrifying question number four
How about documentation? Will we know exactly what we've got? Is it easy to understand? Can we take the reins quickly? We need high quality training and manuals. Will you provide these?

Terrifying question number five
How about reports for EEO, ERISA, and OSHA? Can we handle those? I mean really handle them. Can we meet compliance demands quickly and inexpensively? We'd like to relax on that score.

Terrifying question number six
Will it be a hassle every time we need information? Can our Personnel or Payroll Departments retrieve information without calling in a programmer? Can your retrieval system understand English?

Terrifying question number seven
How flexible is the system? Can we expand it as we grow? Will your people sit down and discuss our particular needs and tailor the system to them? How comprehensive is your Payroll system? What about manpower planning, salary and benefits administration? Or health and safety programs?

Terrifying question number eight
Can you provide a forum—seminars, and so forth—for our personnel, payroll, and data processing people? Can we talk to other users grappling with the same problems? In other words, can you help us keep in touch with the the industry?

Terrifying question number nine
If we can't use our computer, must we shelve the idea? Can we run the system on your computer? Do you have a systems service division to help us do our work? What other clients do they handle? What kind of turnaround can I expect?

Terrifying question number ten
Is your organization stable? Are you financially secure? Will you still be around five years from now if we must expand the system? Are you growing?

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MEMOREXCELLENCE

Ware Warns of Need for Policy To Prevent Information Abuse

By E. Drake Lundell Jr.
Of the CW Staff

HANOVER, N.H. – Computers and information systems are being used to "tighten" controls in society and the U.S. needs a public policy on information to determine just how tight a society is desirable, according to Dr. Willis Ware, vice-chairman of the Privacy Protection Study Commission.

Speaking at Dartmouth College's recent symposium on "Man and the Computer" here recently, Ware said this issue is much larger than the questions raised by privacy rights in the computer age.

One of the first questions to be faced in such a policy study would have to do with the right to ownership of information, he noted. The question of who owns data – the collector or the subject – has to be faced, he said.

Another problem is raised by the possibility of surveillance that comes with the development of large national networks like those proposed in the electronic funds transfer area, Ware said.

None of these systems were proposed or developed with surveillance in mind, but they will contain a body of information that will permit surveillance, he added.

In the absence of a policy preventing abuses of those systems, it is a certainty abuses will occur, Ware warned.

Another area that needs to be examined is the problem of liability in large computer systems, he said, particularly in those systems where machines are routinely making decisions previously made by humans.

In setting a national policy on information, the needs of government and other large organizations for information have to be balanced against the individual's rights to privacy, Ware indicated.

Today there are no real controls over the use of information except in a few particular areas, he added.

The public policy that needs to be developed must establish a framework to prevent harm from the misuse of information or at least give anyone harmed by such misuse a legal right to redress, he said.

Brown Again Nixes Calif. Privacy Law

SACRAMENTO, Calif. – For the second year in a row, Gov. Edmund G. Brown Jr. vetoed an information practices bill, passed by the state legislature, on grounds of cost.

Instead of a law, however, Brown issued an executive order to accomplish the same goals at a lower cost.

In a message issued at the time he vetoed SB 1586, Brown estimated the legislative measure would have cost $4 million to start and $13 million more every year.

The executive order called the right to privacy and the right to petition one's government for redress of grievances "fundamental rights granted and secured to all individuals by the California Constitution."

Model Role

The executive order will give state agencies an opportunity to serve local governments as "a model" of good information practices, according to the order, which takes effect Jan. 1.

Agencies have 30 days to give an individual access to his file unless it is "stored." In such cases, 60-days' elapse time is allowed.

Individuals are not permitted access to any file that does not pertain to them except in the discovery phase of litigation.

Agencies must make any correction requested by an individual, permit him to file a statement of dispute as a permanent part of the file or destroy disputed information within 30 days of receiving a written request.

The order may not be interpreted as giving an individual access to information compiled in anticipation of a civil action or administrative proceeding against him nor may it be interpreted as permitting an individual access to information which is confidential by law.

Files maintained by agencies for criminal investigation or for the purpose of enforcing criminal laws or preventing crime are exempt to protect informants and investigators, the order said.

If an individual is dissatisfied with an agency's actions in fulfilling this order, he can file a petition for mediation.

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State Using Economic Prediction Model Cited as Most Comprehensive in Nation

By Ann Dooley
Of the CW Staff

MADISON, Wis. — The State of Wisconsin is now using an econometric model to forecast its economic future.

Originated primarily for Gov. Patrick Lucy and the state Legislature, the system is believed to be the most comprehensive model in the country, according to Monte Herrell, economist for the Bureau of Fiscal Policy and Analysis in the State Revenue Department.

The model is used primarily to analyze policy and to forecast state revenues on both short-term and long-term bases, Herrell said.

"We can forecast annually to the year 1990, but I admit we have a little less confidence in that long-range information," Robert Milbourne acknowlhedged Milbourne is chief of the Bureau of Fiscal Policy and Analysis.

The model, which is still being refined, is divided into 11 subsectors including such economic factors as tourism, the dairy industry, durable and nondurable goods and local government.

Multiple regression techniques can be used to manipulate 270 equations to project a variety of hypothetical possibilities, Herrell said.

The model includes data on employment, wage rates, estimated government expenditures, state tax revenues, agriculture, manufacturing, tourism and population trends, he added.

The model was developed under a contract with Data Resources, Inc. (DRI) of Lexington, Mass., using a Burroughs B7700. The system operates on DRI's telecommunications system using dial-up lines and CRTs.

State employees have access to the model via time-sharing facilities at government offices.

The system enables state legislators and the governor to estimate the economic impact of a state or federal policy change before making a decision on it, Herrell said.

"The Agricultural Department can estimate farm prices in advance, the Department of Health and Social Services can predict the unemployment rate and the welfare caseload for the future and we at the Revenue Department can learn how much additional revenue we'll get from a specific change in the tax law," Milbourne said.

DP Finds Chimps Forecast Quakes

MENLO PARK, Calif. — Data stored in a computer has led scientists at the Stanford School of Medicine here to believe earthquakes can be predicted by observing the behavior of chimpanzees.

In an effort to explore the accuracy of recent stories about earthquake prediction by villagers in China, the scientist decided to examine data gathered about chimp behavior during some minor quakes in June at Stanford's outdoor primate facility near the San Andreas fault.

On the day preceding each of two quakes, the chimps showed distinctive signs of restlessness.

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Editorial

A Concept Gone Astray

The recent 10th anniversary of the Kiewit Computation Center at Dartmouth College was graphic proof of how far man and the computer have progressed.

And how far they still have to go.

The computer has been effectively developed as an educational tool at Dartmouth so virtually every graduate leaves with the feeling that a terminal is an intimate friend and assistant. These graduates can translate this familiarity into career assets, especially in management.

There is little doubt the '60s at Dartmouth were a watershed in the pioneering of time-sharing, the development by John Kemeny and Thomas Kurtz of an easy-to-use programming language called Basic and the coming of a general attitude that sees the computer as a tool for all instead of an advantage only for the chosen few.

But the impressive achievements at Dartmouth bring into sharp focus how much still has to be done. Dartmouth has developed a unique man-machine interaction duplicated in few other places.

At a symposium called, appropriately, "Man and the Computer," Kemeny, now Dartmouth president, pointed out that little progress has been made toward the goal of an "Everyman's terminal" that would be low-cost and simple enough to be used by all. The elusive computer in the home has been stalled dead in its tracks for lack of the proper equipment and other social reasons, he noted.

The Dartmouth time-sharing concept emphasized the interaction of students at different schools and in different disciplines. But this concept has been sidetracked by the growth at other educational institutions of individual minicomputer systems which the Dartmouth devotees feel are isolating the user.

Perhaps ironically, the Dartmouth time-sharing system has been successfully adapted into a business system and is now used by a handful of large corporations. At the same time, the number of high schools on the Kiewit Center has dropped from more than 20 down to two because more and more high schools are getting minis.

If the computer is to gain a universally accepted position in the way man lives his life and operates his business, more attention should be paid to the attitudes that prevail at Dartmouth.

There are those that claim an educational time-sharing system is several light-years removed from a cost-effective DP center helping a competitive corporation to optimize its profit margins. Maybe so, but there are some important analogies to be drawn between the student who cuts down on homework time with the Kiewit computer and the company president who utilizes a management information system to save dollars for his firm.

'Well, at Least They Aren't Kidding With Their "Lifetime Career Opportunity"...'

Letters to the Editor

IBM Not Only Vendor

Stephen E. Wright's "Programmers Finding How to Use PERFORM"[CW, Nov.29], while quite interesting, was an example of the all-too-common assumption that IBM is the only computer vendor.

The article was general until near the end, where Wright wondered why the PERFORM statement does not generate in-line code and noted this would improve performance in a VS environment.

Oddly enough, some vendors — Univac, for example — do generate in-line code for the PERFORM statement. Also, "VS" specifies a vendor-specific feature to which non-IBM users have difficulty relating.

If Wright had made explicit reference to IBM in his last three paragraphs, the article would have more truly stated what he was trying to convey: that IBM's implementation of the Cobol PERFORM verb should be improved because structured programming has prompted a significant increase in its usage.

Walter J. Gilbert

College Park, Md.

A Word of Caution

While I agree with Stephen E. Wright ["Structured Programmers Should Build on Sections," CW, Nov.15], a word of caution is imperative.

A Cobol section will be executed until another section name is encountered. If you wish to terminate processing of a particular section at an EXIT statement, you'd better follow it with another section name or, if in the Declarative Section, the statement END DECLARATIVES.

Failure to do this will cause processing to continue until the next section name or the end of the Procedure Division is reached. Unfortunately, this is a little known concept and can cause serious debugging problems when used.

William C. Franken

Green Bay, Wis.

Sales Forces Missing the Boat

It was recently my displeasure to require the purchase of two IBM 2316-type disk packs. Wishing to get the best price, I attempted to contact several manufacturers for a price quote.

After calling Memorex, Syncom, BASF, Control Data Corp. and 3M and being switched from department to department in an exasperating telephone search for the elusive "salesman," I had invested three hours of time without one single price.

CDC kept switching me to a department which stated I was asking in "nonstandard" equipment numbers, and 3M could not understand I was not purchasing supplies for a tape recorder.

Won't *someone* in a vendor's sales force ever learn what products are being sold there?

Richard D. Peters

Washington, D.C.

Looking at the Bottom Line

The Page 1 headline ["CPE Finds Three 65s Can't Equal a 168"] in the Nov. 2 issue is undoubtedly true. Whoever denied it?

But the American Airlines evaluation and benchmark team have overlooked one very important fact. For the price of one Model 168, you can lease *six* Model 65s.

And you'll have enough money left over to hire three programmers and a new evaluation team . . . one with a clearer view of the bottom line.

James F. Benton
Executive Director
Computer Lessors Association, Inc.
Washington, D.C.

(Other letters on Page 20.)

Data Past

Five Years Ago
Dec. 15, 1971

BETHESDA, Md. — The General Electric time-sharing network offered a series of capabilities designed to extend flexibility without additional cost. The changes ranged from a means of finding out network information and services to a Fortran IV debugging package.

— — —

AKRON, Ohio — A debugging system that "reversed nearly every approach normally used" in developing on-line programs and located bugs "in a fraction of the time" required by older methods was patented by The Goodyear Tire and Rubber Co.

Eight Years Ago
Dec. 18, 1968

ARMONK, N.Y. — IBM hinted it would price support services separately by July 1, 1969. Industry sources speculated that on or before July 1 IBM would charge for certain types of software, probably applications packages.

These sources thought it unlikely IBM would charge separately for monitors, operating systems, executive routines and other software fundamental to the operation of its computer systems.

The sources also speculated that IBM would charge separately for customized programming assistance, education and training courses and publications.

— — —

CHIPPEWA FALLS, Wis. — Control Data demonstrated its 7600 system for the first time. The system was a redesigned version of the 6600 "Super Computer" introduced five years before. The 7600, aimed at time-sharing users, was said to be four to eight times faster than its predecessor.

Transportability Should Be Base of Software Standards

By Tim Hagen
Special to Computerworld

There are two main reasons for the appearance of higher level programming languages: the desire to allow problems to be programmed in a people-oriented rather than a machine-oriented way and the desire to allow those programs to be machine-independent, i.e., transportable.

Modern high-level languages have largely succeeded in the first goal; hardly anyone would dispute that languages such as Cobol and Fortran are much more people- than machine-oriented, even if he feels that there is room for even more refinement.

The second goal, machine independence or transportability, has been largely met, but hardly anyone would suggest it has been ideally attained. There are several reasons for this:

- There may be very good reason to take advantage of machine features in some programs.
- Manufacturers wish to lock in customers to their equipment and software, so they provide nonstandard or extended language features which tempt programmers. The moment one of these features is used, transportability goes out the window.
- Programmers and their managers are frequently all too happy to take up manufacturers on their invitation to use nonstandard features for reasons of expedience. The programmers can hardly be blamed for this, given the pressure cooker environment in which they are usually put.
- There may be no standard for the manufacturer to follow in implementing very desirable software features such as file handling in Fortran, string handling in Basic and data base interface languages in general.

This is the direct fault of standards makers in Washington. Their failure to respond to the challenge to provide meaningful, current standards to lead the way — instead of half-heartedly adopting lowest common denominator features a decade behind the times — is and will continue to be one of the most expensive cases of negligence ever suffered by the industry.

Site-Specific Standards

Despite all this, responsible, conscientious managers have instituted programming standards within their own installations with respect to documentation, language features to be used and sometimes program logic and structure. The reason for these standards is basically to protect the installation from the effects of transient personnel and, secondarily, to allow the separation of the program development and maintenance functions.

Another strong consideration in the formation of standards is the idea that if programs are kept simple, by force if necessary, somehow they will be written and debugged more quickly. While I agree with this, I also believe this concept should be given a long, hard look before it is arbitrarily applied with the assumption it is true.

In all but very few cases, little thought is given to transportability of programs as an object of standards. This may be because the installation manager is a devotee of some particular manufacturer or because people just naturally tend to think about how to do the best job with the equipment they have or tend to add to what they have instead of possibly getting a new machine someday.

Why is that? Because a new machine is a headache in terms of conversion.

Why is that? Because transportability was not assured by proper programming standards.

Lack of consideration for transportability has therefore led to its own vicious circle, and an installation must pay the price one way or the other for that failure when an upgrade or a new machine is needed.

What should be done? Make transportability the basis of programming standards, not an afterthought. This will leave the installation in an excellent position when an upgrade or a new machine is needed or when the vendor expresses his latest regrets for rate hikes.

It may and should also influence the selection of programming language, as I have previously discussed [CW, April 5]. One certainly would not want to choose a language that is without any standard or wide implementation.

Reader Commentary

It may seem at first that making transportability the primary objective of programming standards is either nonsensical or at best an inversion of priorities. But some thought will reveal that it accomplishes the other objectives of programming standards.

Transportability considerations are twofold: hardware and software. Hardware may be taken care of rather simply, by doing such things as assuming that one has a 16-bit machine that will take no more than two characters per word, any integer larger than $2^{15}-1$, any exponent outside the range ±31 and minimizing the number of files accessed.

The software part is more difficult. It requires that the installation do what the standards people have forced, go to the lowest common denominator of language features, those which have been standardized already, at the very least.

To go further, which may be a good idea, one should realize the manufacturers claim adherence to standards rather lightly. Even if they are in strict adherence, they are frequently far from the spirit.

For example, I have seen a "standard" Fortran which had a large number of reserved words; although it allowed variables six characters long, it required all variables to be unique in the first five characters.

It also gave no warning of any kind if two different six-character variables were not unique in the first five. This was plainly — and the manual admitted it — for the manufacturer's convenience. Such Mickey Mouse shortcuts to compiler and interpreter implementations abound among mini and microcomputer suppliers.

Lowest common denominator standards often, if not always, yield a smaller number of language features than a standard which rejects some features as being too "fancy" for the taste of the standard maker.

In so doing, it nonetheless removes "fancy" features and gives a simple language subset which, when combined with a few procedural principles, leaves the programmer with a simpler language environment which tends to render simpler, cleaner, easier and quicker to debug code, because the discipline imposed reduces the likelihood of obscure logic errors.

This leaves the manager in a much better position from which to sympathize with a manufacturer whose prices have gone through the ceiling as its machine goes out the door to make room for a much less expensive one.

Even without this situation, mini and microcomputers will soon be inexpensive enough to begin the dedication of them to some previously centralized production.

The ease with which software can be transported to these machines will often be the determining factor of their feasibility. So making transportability a major objective accomplishes most, if not all, other objectives while maximizing installation options.

In Age of Data Bases, Users Must Check Their Files

It must be a constant aggravation to the marketing people of the Shawmut Bank of Boston that some people, restaurants, stores, etc., simply won't accept Master Charge despite all the persuasions that are offered. So it is not surprising all sorts of schemes have been thought up.

The Taylor Report
By
Alan Taylor, CDP

One came to fruition last month which will probably help the bank obtain more interest-bearing loans, but appears to be an illustration of how unexpected results will arise when computer files are used for unexpected operations.

In this case, what appeared to be a routine action resulted in a basic breach of banking security.

The system adopted by Shawmut is called Master Checking. To quote the advertisement sent to thousands of Bostonians:

"It's a way to get a cash advance from your Master Charge account by writing a check from a little book of Master Checking checks. They look like personal checks, so only you know when you write one that you're drawing on your Master Charge line of credit."

The blurb was quite correct in its description. The Master Checking checks do look like personal checks. True, the book is different; there are neither check stubs nor any place to record such data as to whom checks were paid, when or for what. Apparently Shawmut doesn't encourage its Master Charge people to keep such records — just to go on signing unrecorded checks on their accounts.

Printed on the outside of the book are the words "Master Checking," which aren't always seen when a check is handed over. As the blurb stated, "They look exactly like personal checks."

As personal checks, they are as open to forgery as any other check. In particular, unlike open credit card charges, they are in no way limited in amount.

Bank Tradition

Personal checks, particularly blank ones, are regarded as valuable documents by banking tradition. "Negotiable instruments" is the jargon phrase. They are not to be scattered around wholesale by any responsible banker.

When accounts are opened, the importance of keeping them secure is impressed upon the accountholders. Watching to see that checks have not been taken surreptitiously from the back of the book is only one of the precautions accountholders are again asked to take to ensure no blank checks get outside the immediate control of the proper hands.

When replacement books are sent out by mail, accountholders are asked to check they are complete and to safeguard them. And the books are sent out only after a direct request from the accountholder, so there is no question they are wanted and expected.

Whether the marketing people or the banking authorities know about it, the recent Shawmut action ignored these elementary precautions. The lack of check stubs, the failure to number the checks and a system which doesn't even return the check to the accountholder all encourage poor security.

The Shawmut people must be expected to know these design points. But did they realize the computers would send the checks out to nonactive accountholders at obsolete addresses?

I doubt it, but it happened.

And it seems to be the typical type of computer error which we will see more and more as we go into data bases.

One such unwanted, unexpected checkbook was received by a former Master Charge accountholder who had canceled his account and cut up and returned his card some months ago, along with a new card he received. His name and his wife's name were imprinted on the checks. The checkbook came unannounced by ordinary mail in mid-November.

No receipt was requested. Nothing else had been received for months since the account was closed.

Tracing the Error

Clearly, the Master Charge files were used without being purged. Shawmut only knows that the people on file have at some time been cardholders. It knows a superset of the current cardholders, but not the actual people. And it probably never realized this.

It is quite natural that this is so. File designers will argue until they are blue in the face against including "unnecessary" fields. For processing the credit card system, there is no need to record whether a cardholder has closed his account.

All that matters is the amount of available credit. Change the credit limit and you can simulate the result of closing an account by the bank. Do nothing and purge the file annually of nonactive accounts and you can simulate the result of closing the account by the cardholder.

Have a few algorithms about ceasing to send monthly statements to nonactive accountholders and there is no reason to waste space recording "close" instructions. No reason as far as the systems analysts can see, that is.

Nor is there any reason for overruling the file designers' decisions apparent in the marketing department (assuming they were known, which is unlikely). The file has been successfully used for all sorts of marketing purposes — such as investigating attitudes to credit questions and various other promotional mailings.

There is nothing wrong with using a superset of accountholders; all it wastes is a few stamps and, who knows, some people may reactivate their accounts.

It's almost certain that when the idea of sending checks was discussed, no one in marketing, security or DP realized a security breach was being committed or that Shawmut didn't have records showing who had closed their accounts.

Concrete Example Omitted

When I wrote the Nov. 22 column about getting ready for data bases, I wasn't able to give a concrete example of what type of mistake would occur as a result of the turnover — not because I couldn't think of one, but for the simple reason that any hypothetical "error" can be objected to on the following grounds:

- People would have included more data in the hypothetical file.
- People would have instituted a more rigorous selection procedure in making extracts from the superset file so as to obviate the problem.
- People would never think of using the file for the distribution of valuable negotiable instruments.

Only the history of mistakes that have actually taken place can really document the type of problems that are coming and can help in their extirpation.

That may require the introduction of a new three-letter word into our DP jargon — but that's for another article.

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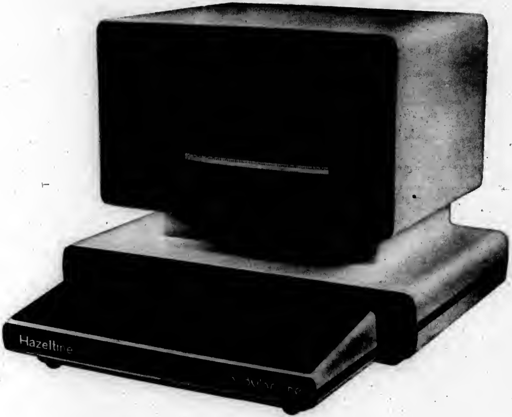

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Tech Writers' Prospects Great As DP World Comes Full Circle

By Joseph T. Rigo
Special to Computerworld

In the beginning, the chief programmer had an editor to help with the paperwork. The editor kept the specs up to date and wrote manuals for customers and the field service staff.

These days, the chief programmer has a computer librarian/documentalist. This person corrects spelling and grammar, files listings and runs out for coffee.

What happened to the editor?

Harlan Mills of IBM invented the chief programmer team. Fred Brooks described the original concept in his book, *The Mythical Man Month*. Among other things, Brooks said:

"The [chief programmer] is responsible for generating the documentation — for maximum clarity he must write it. This is true of both internal and external descriptions.

"The editor, however, takes the draft . . . and criticizes it, reworks it, provides it with references and bibliography, nurses it through several versions and oversees the mechanics of production."

Mills and Brooks saw the editor as a high-class person. They even supplied the ultimate accolade — a secretary to help keep the paper flowing.

Other companies wanted to adopt the chief programmer concept. After all, if it's good for IBM, it must be good for the First Bank and Trust Co.

Right? Wrong.

Mills invented his team in the environment of an IBM development laboratory. The concept is ideal for programmers who produce highly complex software, such as operating systems for virtual storage, time-sharing and multiprogramming.

These projects involve hundreds of people around the world. Eventually programs written in Poughkeepsie, Palo Alto and the Nordic Labs must come together and work as a unit.

It takes a lot of paperwork — constantly updated — to do this successfully.

More paper goes into program logic manuals for the field service staff. And still more goes into user manuals for customer programmers.

The process provides work for several dozen highly trained and experienced technical writers. At least one of them functions in each project team as an editor, in the best sense of the Mills concept.

Reader Commentary

For contrast, consider the systems department in a large bank.

First of all, the person who does the chief programmer's work, as Mills defined it, is called a systems analyst. This person used to be a programmer, but the only way he could get ahead was to move into a job where his technical skills get obsolete.

Those who remain as programmers aren't allowed to design anything more complicated than a MOVE statement.

This can be very frustrating for a good technical guy who, naturally, loves computers and hates people. He doesn't want to become a systems analyst, but he is essential, so the company makes it up to him by calling him a chief programmer.

This person does not need an editor. He

(Continued on Page 20)

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Letters to the Editor

Getting in Touch

In the Nov. 8 editorial, "Mini Users Take Giant Step," a reference was made to the Minicomputer Industry National Interchange (Mini) organization.

Although the Collins Division of Rockwell International is not a minicomputer manufacturer, we do use the Digital Equipment Corp. PDP-11 extensively.

I would like to know if it is possible to become an associate member of Mini or, at least, be made aware of conferences conducted by this group.

Any assistance you might provide would be appreciated.

William R. Myers
Manager/Advanced Planning
Collins Division
Rockwell International
Dallas, Texas

Mini is located at 2460 Lemoine Ave., Fort Lee, N.J. 07024. Ed.

How About Boustrophedon?

I don't like bidirectional printers – the name, not the device. The prefix "bi-" suggests something that works both ways at once, like bilateral, or sometimes one way and occasionally the other, like bisexual.

What is needed is a word that means writing alternate lines in opposite directions, in the manner of oxen plowing a furrow.

And what do you know, there is already a lovely 75-cent word, *boustrophedon*, with this precise signification.

In an industry where terminological exuberance is by no means uncommon, the boustrophedon printer should achieve immediate popularity.

Stuart R. Sheedy
Lynbrook, N.Y.

Where to Get Reprint

I read with interest the Taylor Report, "DPers Must Get Ready Now for Real Data Base Life" [CW, Nov. 22]. I would like to obtain a copy of the National Bureau of Standards' Special Publication 451, "Data Base Directions — The Next Steps," and would appreciate it if you would let me know where I can obtain a copy of this publication.

James L. Smith
Baltimore, Md.

It can be ordered for $2.40 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Ask for catalog C13.10;451, quoting NBS-SP 451. Ed.

Outlook Never Better For Tech Writers

(Continued from Page 19)

especially does not need an editor with a secretary.

The entire development team works in one room. Analysts and programmers do their own documentation. A writer may be brought in for the user manual, but this person is not expected to be strong technically.

Still, it is fashionable to have a computer librarian/documentalist on the team. So all the project dirty work is collected into a single job description, and some poor innocent soul is pushed into it.

It is not a real job. It requires a mixture of interests and aptitudes that don't exist in any one person, and it has no future. It is almost always an experiment, and it tends to disappear quickly whenever new management takes over.

Fortunately for the technical writing profession (and for die-hard programmers), the applications world is becoming more complex. A corporate teleprocessing system can require almost as much development paperwork and programming skill as virtual storage.

At the same time, users are demanding more and better reference material for their new systems.

And, finally, the sins of the past are catching up with current managers. Their shops are littered with essential but undocumented systems. They are paying through the nose to get maintenance documentation produced before the last surviving programmer retires to Arizona.

The trend is clear. The tech writer's job is becoming bigger. Prospects were never better for writers who keep up to date technically.

The chief programmer will have his editor back any day now. Complete with secretary.

Rigo is president of Sysdoc, Inc. in New York City.

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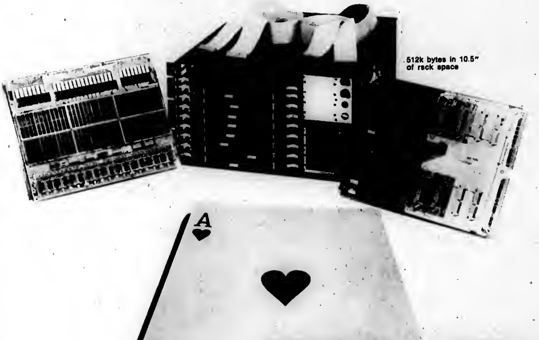

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Random Notes

Program, File Changeovers Eased With NCSS 'Convert'

NORWALK, Conn. — Programs or files can be adapted from one operating environment to another with a process "as simple as compilations" now available on the National CSS, Inc. (NCSS) remote computing network, a spokesman claimed.

Developed by Oli Systems Inc., the Convert process permits the user to develop a set of rules for a specific conversion.

These rules are stored on the network and can be retrieved whenever needed, he noted from company headquarters at 542 Westport Ave., Norwalk, Conn. 06851.

DOS Library Compare Feature Added to 'Dossier' Package

PORTLAND, Ore. — A Library Compare feature, recently added to the Dossier software package from Computer Concepts, Inc., analyzes object code on user libraries and builds a file on program and file usage, a spokesman said.

By comparing this file over successive runs, Dossier users can document changes in IBM DOS and DOS/VS program libraries, he claimed.

The package, including the Compare feature, costs $85/mo under a one-year license, he said from 6443 S.W. Beaverton Highway, Portland, Ore. 97221.

Subscribers Get Price Break On Value Line Data Base

NEW YORK — Value Line Data Services has cut both the annual and the quarterly subscription price for its 65M-character data base of corporate histories and forecasts.

The data base is available directly from Value Line or through any of five remote computing networks.

An annual subscription now costs $5,000 while the quarterly subscription is priced at $2,000, Value Line said from 5 E. 44th St., New York, N.Y. 10017.

'Strobe' Now Monitors DOS/VS

CAMBRIDGE, Mass. — Programmart Corp. has introduced a version of Strobe which supports DOS/VS users with a system performance profile.

Previously the package had been offered only for OS and OS/VS, the company said from 133 Mt. Auburn St., Cambridge, Mass. 02138.

Productivity Management-Part 1

Chaos— Then a Revamped System Cycle

Special to Computerworld

BOSTON — After seven years of uninterrupted growth, a software firm here decided in 1973 it had learned enough to begin bidding for custom software development on a fixed-price basis.

The decision turned out to be a premature one: by the end of the year, the publicly owned firm wrote off more than $400,000 in overruns on fixed-price jobs — an amount equal to 10% of its annual revenues at the time.

"We thought we knew all about large dollar-value development contracts, but we were proven wrong in a very painful way," John F. Keane, president of Keane Associates, Inc., recalled.

So the company took rigorous steps to impose better internal controls. Francis A. Frank, corporate systems manager, and John R. Reilly, senior systems consultant, developed a project management system that went far beyond the system then used by the 150-person firm.

"But it didn't do the job that well, so we looked harder at the problem of precision management of technical personnel. And when we did, we discovered project management techniques, for all tbeir value, control in just two dimensions — time and cost.

"What was missing was a third dimension: the people aspect," Frank stated.

He and Reilly spent the next six months assembling and analyzing 18 major projects — each over $100,000 in value — to piece together a project control system that made sense. They even hired outside consultants from the Harvard Business School to analyze the case studies "with the objectivity we knew we didn't have because of our prior involvement in many of the cases," Reilly said.

The result, borne out in practice during its 1975 operations, was the development of a methodology Keane calls "productivity management." It is a six-step process "that comes closer than any other management method to predicting and controlling the outcome of complex large systems developments," he said.

In the 18 months Keane Associates has used the technique, cost overruns on a similar level of fixed-price jobs have been reduced to under 2%. Keane is so enthusiastic that he recently instituted a series of in-house and general seminars for large customers to train them in productivity management principles; to date, nearly 600 systems and DP managers from 80 companies have taken the course.

"It has become very popular with users. We've scheduled more than a dozen courses right through next spring," Keane said.

Because it is oriented to the sensibilities of people, productivity management struc-

(Continued on Page 22)

'Control 2000' Data Dictionary Ties Into 'System 2000' DBMS

AUSTIN, Texas — Control 2000, a data dictionary package to be released early next year by MRI Systems Corp. for its System 2000 data base management system (DBMS), will be expanded "in the very near future" into the area of overall system and project control, according to MRI.

The package "somewhat rounds out" the company's basic plans for data base management using System 2000, he said. The system now includes a host language interface supporting application programs in Assembler, Cobol, Fortran and PL/I, an update and query language and a teleprocessing monitor — TP 2000 — in addition to System 2000 and Control 2000, a spokesman noted.

In its early release form, Control 2000 is said to provide all the facilities traditionally associated with a data dictionary, including accumulation of information about data fields and records, schemata, reports, programs and data base definitions, he added.

Standard reports showing the interrelationships of the various entities are provided along with one-time "what-if" or data base modification impact reports. In that way, Control 2000 provides data base administration facilities for both data bases and conventional files, MRI noted.

Since Control 2000 is itself a System 2000 data base, the information generated by the dictionary package can be accessed and manipulated by the query and update language of the basic DBMS, the spokesman added.

System 2000 has been implemented on IBM 360/370, Control Data Corp. 6000 and Univac 1100 mainframes. It ranges in cost from $30,000 to $125,000 depending on features and options selected.

Like the TP 2000 monitor, the initial release of Control 2000 can be used only in an IBM setting, MRI said.

The dictionary package costs $15,000. MRI can be reached through P.O. Box 9968, Austin, Texas 78766.

'Wang/3' Puts Payroll on IBM 3

LOWELL, Mass. — Full support including program updates when taxing jurisdictions change their requirements was cited by Wang Laboratories, Inc. as one of the features of Wang/3, a payroll package for the IBM 3 user.

The package was designed to handle all the conventional functions of a payroll system, including an "unlimited" number of payroll groupings, 10 categories of earnings and more than a dozen different deduction categories for each separate pay group.

Wang/3 routinely produces payroll checks, check registers and other management information reports as well as quarterly 941A reports for Social Security and W-2 forms for each employee at the end of the year, Wang noted.

Special reports based on any information in the master file can be put together with the system's report generator.

Multiple jurisdictions are supported by Wang/3 including U.S. federal, state and lower — New York City, for example — income tax procedures. Even Puerto Rico and the Virgin Islands are covered by Wang/3, a spokesman noted.

Wang/3 currently includes a direct deposit payroll capability enabling a using company to forward payments to an employee by electronic transfer of funds to a bank specified by tbe employee. Wang guarantees continual compliance with National Automated Clearinghouse Association specifications, the spokesman added.

The payroll system is written in ANS Cobol and can be run on IBM 3 configurations that include IBM 3340 or 5445 disks. The package costs "less than $18,000" and can be ordered from Wang's Program Products Division, One Industrial Ave., Lowell, Mass. 01851.

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Fixed Asset Package Modified

ATLANTA — The Fixed Asset/Property Accounting System now available from Management Science America Inc. (MSA) is more compact in terms of programs and more extensive in terms of facilities than MSA's previous system, according to a spokesman.

The repackaging includes only three programs and two files, he said, compared with the 11 programs MSA once used.

The system still provides accounting information concerning depreciation, property status and expense data; it performs calculations for standard depreciation methods plus units of production, with automatic switching at the optimum point, he claimed.

The system maintains seven sets of books for financial, tax and regulatory reporting.

Said to be of "great current interest" to many clients is the Insurance Reevaluation Module, which calculates both current asset replacement and insurance values.

These can be "extremely useful" in purchasing realistic insurance coverage and reporting replacement costs to the Securities and Exchange Commission, MSA said.

While the system generates a range of standard reports and government forms on a regular basis without outside intervention, a Special Report Generator provides flexibility to meet one-time needs. With this feature, users can prepare "any report with any format, any headings, totals, parameters and sequence desired," the vendor said.

Written in ANS Cobol, the software is available for use on IBM 360/370s and Burroughs equipment.

MSA at Suite 1300, 3445 Peachtree Road N.E., Atlanta, Ga. 30326.

Datapoint-to-Syfa Shift Eased

IRVINE, Calif. — A translation package now available from Computer Automation, Inc. (CA) simplifies the conversion of on-line applications from Datapoint to CA equipment, the vendor said.

Called Uhuru, the package converts Datashare and Databus source code to CA's Sybol for use on Syfa systems.

Syfa systems were designed specifically for distributed processing applications. The Syfa Concurrent Logic Operating System (Syclops) supports the simultaneous execution of 24 interactive applications, synchronous communications to a mainframe, dual print spooling jobs and 16 background utility programs, a spokesman added.

A typical environment in which conversion from Datapoint to Syfa would be most effective, he said, would include the need to increase memory to as much as 304K, the number of terminals to 24, the number of printers to two and disk storage capacity to 640M bytes.

Although automating the conversion process reduces the programmer effort that might otherwise be involved, Uhuru still requires appreciable time for its handling of the work; CA estimated approximately 30 minutes are needed to convert a Datapoint source program to Sybol.

Uhuru is offered free to Syfa system users who have Datapoint programs on Syfa-compatible media, CA said. A media conversion service — "at a nominal charge" — is also available from CA, the spokesman added from 18651 Von Karman, Irvine, Calif. 92713.

DP Concepts Covered In Auditors' Course

KANSAS CITY, Mo. — "EDP Essentials for the Auditor" is a 56-module course now available from the Edutronics Group.

Twelve separate units, each a series of course modules, cover a range of subjects — to support both internal and outside auditors, a spokesman added.

Available in "Super 8mm" film, 16mm film and 3/4-in. videotape cassettes, the course may be purchased or leased from the Edutronics Group at 3435 Broadway, Kansas City, Mo. 64111.

Revised Development Ends Firm's Chaos

(Continued from Page 21)

tures itself in many ways that are completely opposite from conventional management theory. For example:

- The final systems test plan must be completed in detail even before general system design is begun, an apparently impossible task until one realizes it represents the ultimate in goal setting.
- Picking the development team is a requirement that must precede any effort to define time and costs.
- Complex flowcharts, systems schematics and Pert and Gantt charts — considered de rigueur in innumerable development projects — are banned. Only simple-to-understand "organization-like" charts are allowed.
- No task in a project — even if the total project is a year-long, 20-person development effort — is permitted to take longer than two man-weeks from start to finish.

Remove Hassles

All of these seeming contradictions not only work, but they virtually remove "all of the hassle, confusion and anticipation of disaster" that characterize so much software development work, Frank claimed.

The entire theory is based upon six principles which, when listed, seem simple and obvious. When employed within the Keane system, however, they impose a totally new level of awareness, responsibility and "binary decision making" — that is, "it's done or it isn't" — on every small step in the development effort.

"Managing within tightly defined boundaries makes managing easier. You're not faced with massive decisions at any point, just one continuous flow of easy choices," Keane explained.

Six Key Rules

Productivity management's six rules of thumb are:

1. Define the job.
2. Assemble the right people.
3. Estimate the time and cost.
4. Impose the 80-hour rule.
5. Encourage changes of specification.
6. Establish acceptance criteria.

Within these rules is a carefully developed web of relationships and structures that gives productivity management its clout.

The next article in this series will describe in detail the reasoning behind the sequence of the phases in productivity management and the amount of work Keane Associates expects to get done in each of the phases.

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Cobol Program With PERFORMs Doesn't Have to Be Inefficient

By Drew Bourrut

Special to Computerworld

Concepts and Techniques

It should be the goal of every DP installation to increase productivity by eliminating inefficiency. A problem arises, however, when we try to define what we mean by inefficiency.

Stephen Wright, in his article on the Cobol PERFORM verb [CW, Nov. 29], said in reference to structured programming and the use of the PERFORM verb as part of hierarchical control: "This technique . . . is meeting with some resistance because of the costs in time and space."

Question for a Question

I agree that the Cobol PERFORM verb as presently implemented by "linkage mechanisms" does, in many instances, cause some increase in run time and core storage requirements and therefore that linkage mechanism is inefficient.

But does this mean a structured Cobol program replete with PERFORM verbs is inefficient?

In order to answer this question, another question must be asked: "What makes a good (efficient) program?" There are four factors which must be a part of every good program.

First, a good program must be accurate. That is, it must do exactly what the specifications demand.

A structured program is more likely to be accurate because it is easier to see exactly what the program is doing as it is being built. Also, it is easy to check for accuracy through structured testing techniques.

Second, the program must be predictable. Unless I can predict the effect when given a cause, my program is unpredictable and I can never be sure it will do tomorrow what it does today.

Third Criterion: Maintenance

Third, the program must be easily maintainable. Good programs as well as bad require maintenance from time to time and it should be reasonably easy to do that maintenance.

Finally, a good program should be reliable. Like a good car, it should not continually break down. If it does, it is not reliable.

Because of its functional orderly approach, structured programming allows the programmer to produce a better, more efficient program. It is easy to see a structured program is more efficient than an unstructured one by noting just one thing – people are now more expensive than computers.

In addition, consider how many one-time "quickie" programs grow up to be the granddads of the installation, haunting it forever.

Because programs last so long, if a program is accurate, predictable, maintainable and reliable, then it should be of minimal consequence that the PERFORM implementation is inefficient.

Bourrut is president of Bourrut Consulting Corp. in Smithtown, N.Y.

Workshops to Cover Performance Auditing

ROCKVILLE, Md. – Keston-Barnett Associates will offer a series of workshops on "How to Conduct a Performance Audit of Your Computer System" in several major cities after the first of the year.

The workshops are aimed at upper level managers responsible for DP, DP auditors and DP staff with cost responsibilities, according to consultant Arnold Barnett.

The sessions will cover evaluation techniques including the traditional area of equipment utilization as well as software, personnel, systems development, application effectiveness, quality control, reliability and organization.

Sites of Sessions

The workshops will be held in Washington, D.C. on Feb. 7-11, March 7-11 and May 2-6. Newport Beach, Calif., will be the site for a workshop Jan. 17-21; another will be held in San Francisco March 21-25; and New York will be the location April 18-22.

The five-day course costs $595, which includes curriculum materials and lunch each day.

Keston-Barnett Associates is at Suite 603, 1010 Rockville Pike, Rockville, Md. 20852.

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A Way to End Discrimination

Seen as Machine, Software's Image May Improve

By **Martin A. Goetz**
Special to Computerworld

Discrimination in America is nothing new. Traditionally, the conflict has been between the "haves" and the "have nots." Those in power want to stay in power. Those on the outside want to get inside.

Software companies have been viewed as existing merely to help hardware companies build software or to work with users on improving hardware performance. The hardware and the hardware companies were the focal points.

You pay for hardware and you get a lifetime supply of software free. That was the sales pitch prior to 1970 and still is for some hardware manufacturers. Their position has been that software is in the public domain and, consequently, should be freely exchanged without being considered anyone's property.

System control programming is different. That free, one-of-a-kind operating system is yours — gratis — except for a few strings. You must accept the bugs and inefficiency as the price for all those hard-to-measure but free facilities.

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Operating-system software is no different from any other piece of software. So, we look forward to the day when the user will be able to select, compare and pay for the operating system of his choice.

Viewed as Machine

The key to removing software discrimination lies entirely in the realization that software — like hardware — can be viewed as a machine.

According to *Webster's Dictionary*, a machine is an apparatus consisting of interrelated parts with separate functions, which is used in the performance of some kinds of work.

This past June, the Association for Computing Machinery (ACM) council voted to submit to the membership an amendment eliminating the word "machinery" from the association's name. Some believed it to be a poorly chosen word, not representative of the full range of DP activities.

While that argument may have some merit, "machinery" is a very basic word that could very well bring about a better understanding of exactly what DP is all about and why there has been so little "professional" or "quality" software developed over the last 20 years.

The term "software engineering" was coined about 1965. Since the early '70s, new ideas have appeared directly relating to building good software.

And, during this 10-year period, there have been court cases (even including Supreme Court reviews) to determine if "machine claims" are applicable to the protection of inventive software concepts vis-a-vis the patent system.

Today, most literature describes a computing machine as being constructed of elements of hardware, elements of software and elements of firmware.

It is only when one takes the position that the software component itself is a machine (or a machine part) that eyebrows and voices are raised by numerous skeptics.

In fact, software is a complex undertaking that very clearly parallels the building of hardware machines (or the hardware component of the computing machine).

The Hardware Machine

Traditionally, the building or developing of a "hardware machine" — from its conception through the assembly-line checkout to its operational acceptance — reflects a continuous flow of accepted steps, including design, engineering, implementation (manufacturing), computer testing, operational prototype, quality control testing, production model and maintenance.

Software, especially commercial applications software, is not always developed or maintained in such a systematic manner.

Since a sound commercial application must reflect a corporation's changing and growing requirements, the operational application is generally subject to continual modification and enhancement. Therefore, it is even more critical that software be systematically built so it can subsequently be systematically maintained.

Building, Engineering Tools

The building of anything, be it a house, hardware or software, cannot be done well without proper tools. Tools can not only cut costs and save time, they can also improve the quality and reliability of the end product.

Since 1970, the number of software tools available to users has increased significantly. But, most users — even though experiencing productivity gains — still do not recognize the software they are constructing as a machine.

With the introduction of new software tools in the early '70s, a new emphasis has been placed on how to build and maintain software.

Professionally engineered software, like professional hardware, would be developed with reliability, efficiency, maintainability, standardization and quality considered essential to the finished product.

The Payoffs

What does all this mean to the DP community? Structured programming and structured design represent only the first step toward building software in a disciplined manner.

A recent Applied Data Research, Inc. survey of active users of software tools showed there have been productivity gains of up to 200%, with average gains ranging about 100%.

Translated into dollars, this means software costs can be reduced by at least 50% and as much as 67%.

Goetz is senior vice-president of Applied Data Research, Inc. in Princeton, N.J.

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CPM Program Can Boost Productivity, Reduce Costs

By Larry E. Hart

Special to Computerworld

Today's corporate and DP managers are vitally concerned with using each computer system to its fullest. Data centers are finding they need the skills of the computer performance evaluation (CPE) technician, yet even those skills aren't really enough.

Performance Evaluation

CPE must be used as the basis for at least a limited form of computer performance management (CPM).

Rising DP costs must be controlled, and extending useful life is a primary cost control mechanism. For example, if a company leasing computer A at $25,000/mo can delay the acquisition of computer B at $40,000/mo for an 18-month period, then the net savings — $15,000 multiplied by 18 — is $270,000. This is a direct dollar savings that can be attributed to a performance program.

The typical process of acquiring a new system starts when, by some evaluation procedure, a company determines computer A can no longer accomplish the required tasks.

This decision may be based on a decrease in throughput, an increase in turnaround time or the fact that the system is running three shifts per day seven days per week and there is still work to be done.

The company then determines computer B will solve its problems and meet its requirements. This may be as a result of simulations or other user experiences; in some cases, computer B may be chosen because it is the next system in the vendor line and, by vendor statistics, is x times faster and more efficient than computer A.

Cost Benefits of CPM

Without CPM, this selection process often results in extremely short-term solutions because the performance bottlenecks on system A were not solved, but only passed onto system B. This selection technique always results in increased DP costs.

With a CPM program, cost savings can result from extending the useful life of system A. The first step is to conduct or to commission a system performance study to identify the present resource utilization, workload, productivity and performance bottlenecks.

If immediate action is required and no formal in-house performance program exists, the most cost-effective method is to hire an outside consulting company for this study. In-house efforts require a lead time of at least six months for staff training before they become truly operational and beneficial; an outside consulting company can bring rapid results as well as train an in-house staff for future efforts.

The next step is to tune the system based upon the performance recommendations of the study. This process must be an in-house function — any changes to the system, operations or user programs must be made by in-house personnel to maintain both credibility and continuity for future support.

Once the tuning is complete, a follow-on study should reevaluate the performance criteria, determine if bottlenecks have been eliminated and predict the amount of time actually added to system useful life.

This is done by reviewing reserve capacity for all resources, predicting a growth rate and identifying when and where resource saturation limits will be reached. The result is a plan identifying future needs for either equipment or tuning efforts.

Some typical tuning efforts include file reorganization, device reallocation, program optimization, modification of certain system parameters and workload shift balancing. These efforts often result in a reduction or even elimination of new equipment requirements and almost always result in a direct cost savings.

Upgrade Justification

Justification for equipment upgrades directly results from performance management. Every system has practical limits and saturation points which, when reached, eliminate the need for all tuning efforts. Only so much work can be processed by a given system.

Without CPM, justifications for upgrades are strictly subjective and management approval is often difficult to obtain. With CPM, equipment requests are based upon actual need, i.e., saturation points, and are thereby justified, resulting in management approval.

The evaluation criterion for productivity depends solely upon each DP center's environment, but may be defined as more jobs per day, more transactions per hour, shorter turnaround time per job or shorter response time per transaction.

Without CPM, increased productivity is typically accomplished by adding shifts, people or new equipment, resulting in significant increases in cost.

CPM, however, provides increased productivity by discrete system tuning efforts and continuous performance management efforts designed to meet the productivity requirements of each DP center.

Indirect benefits include savings in executive and other user personnel time by providing quicker reports, more access to information or faster response on terminals.

Cost reductions, defined previously through extending useful life and reduction of work shifts, also include reductions in equipment and/or personnel.

The types of cost reductions desired depend upon the objectives of each organization. Some companies wish to maintain surplus equipment as reserve capacity for future growth; others wish to reduce costs as far as possible.

CPM allows the consolidation of multiple mainframes, elimination of some peripherals and/or control units, elimination of extra shifts and negotiation for longer term leases and lower monthly costs.

Without CPM, DP costs will continue to rise as demands increase. With performance measurement, costs can be controlled and reduced. Discrete performance tuning efforts and continuous performance management enable DP management to maintain the optimal configuration mix and operational status to provide desired services at minimum costs.

Hart is the manager of performance services at CACI, Inc.-Federal, Reston, Va.

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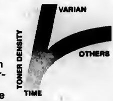

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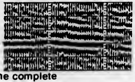

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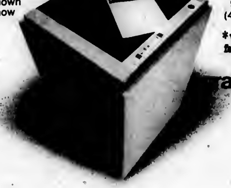

Data Briefs

Terminal Controls Devices Interfaced With IEEE Bus

CONCORD, Calif. — The Model 3530 controller terminal from Systron-Donner Corp. allows a user to control instruments and computer peripherals connected to an IEEE bus.

The 3530 is a microcomputer-based CRT/keyboard terminal that also includes a tape cartridge drive, 16K bytes of memory, monitor read-only memory and IEEE 488, teletypewriter and RS-232C interfaces, according to Systron-Donner.

Software of the Model 3530 is interactive Basic with mathematical functions, string variables, syntax error responses, immediate and deferred modes, editing, debugging and subroutine features, the company said.

The controller terminal costs $5,950 from the vendor's Data Products Division, 935 Detroit Ave., Concord, Calif. 94518.

Livermore Drops Coupler Price

LIVERMORE, Calif. – Livermore Data Systems, Inc. has dropped prices on its RS-232-compatible Model 76B acoustic coupler ordered in quantities of 50 or more.

Prices have been lowered from $245 to $180 each in quantities from 50 to 99; from $210 to $170 for 100 to 249 units; and to $29 for each unit in quantities of 1,000.

Livermore is at 2050 Research Drive, Livermore, Calif. 94550.

Price of AJ 841 Reduced

SUNNYVALE, Calif. — Anderson Jacobson, Inc.(AJ) has reduced the price of its AJ 841 interactive remote computer terminal.

An AJ spokesman said the terminal previously cost about $3,000 and now costs $995.

A built-in modem and an acoustic coupler can be purchased for another $75, he said from 1065 Morse Ave., Sunnyvale, Calif. 95131.

Business Executives Get Newsletter

CHERRY HILL, N.J. – Management Information Corp. (MIC) has a data communications information service aimed at the business executive.

The *Datacomm Awareness Report* is said to be a user-oriented monthly newsletter designed to help the executive, DP manager, telecommunications manager and others cope with data communications technology.

The report, first published last month, is available for $70/year from MIC at 140 Barclay Center, Cherry Hill, N.J. 08034.

Survey Results Indicate

Terminal Users Pleased, Not Thrilled

DELRAN, N.J. — Prospective users of remote batch terminals (RBT) should expect good — but not great — overall performance from major vendors' terminal offerings, the results of a recent survey indicated.

In its latest report, "All About Remote Batch Terminals," Datapro Research Corp. here found users of Comterm Ltd. RBTs were most pleased with those terminals' overall performance while all 250 users surveyed gave their RBTs an average overall performance rating of 3.2 points on a four-point scale.

The Datapro survey drew 399 responses from users with a total of 1,771 installed batch terminals in large part from 18 vendors. The users were asked to rate their terminals' overall performance, ease of operation, hardware reliability, maintenance service and software and technical support with a rating of 1 for poor, 2 for fair, 3 for good and 4 for excellent.

The Comterm terminals (3.5) were followed closely in the category of overall performance by those of Data 100 Corp. with a rating of 3.4 and CMC Division of Pertec Computer Corp., IBM and Sycor, Inc., which tied for third place with ratings of 3.3.

Ratings for the Comterm RBTs, however, were based on three users' responses for as many terminals; Datapro cautioned prospective buyers should note that small sample sizes for some models and manufacturers "make it unwise to draw conclusions from the indicated ratings."

In the area of overall performance, no terminal received a rating lower than the 2.0 given to the Burroughs Corp. DC 1100, although Burroughs terminals scored well as a group with a 2.9, the Datapro report showed.

Data General Corp.(DG) with its Nova 2/10 and Mohawk Data Sciences Corp.'s RBTs took top honors for ease of operation, with ratings of 3.6 each.

Runners-up in this category were Comterm and Data 100 devices, gathering ratings of 3.5 and 3.4 respectively, while Datapoint Corp.'s units and those of Four-Phase Systems, Inc., Harris Communications Systems, Inc. and Sycor were given scores of 3.3, according to the report.

Users of IBM equipment rated their 619 terminals below the 3.2 average for all terminals with a 3.1 overall score on ease of performance, the report noted.

DG's Nova 2/10 also received the highest rating from users of the four RBTs represented with the only perfect score in the area of hardware reliability.

Ratings of 3.3 were given to the IBM and Sycor terminals, while third place in hardware reliability was gathered by Four-Phase and Data 100 terminals with ratings of 3.2 each, the report said.

The three Comterm terminals represented in the survey were given the highest score for maintenance service — 3.5 — and IBM RBTs were close behind with a score of 3.3.

According to survey results, software and technical support of vendors' RBTs were rated lowest by all users with a rating of 2.6 overall. The two highest scores in this category were Datapoint's 1100 and 2200 models and Data 100's terminals, which received ratings of 3.0 and 2.8 respectively.

IBM units were rated third by its users (2.7), while equipment produced by Digital Equipment Corp. (the PDP-8 and PDP-11) and CMC/Pertec received the average mark of 2.6, the report said.

The Datapro report also contained detailed specifications of 109 "terminals" from 43 vendors, including the DEC PDP-11, IBM 360/20, NCR 499 and other "free-standing processors."

Datapro noted that while these devices don't fit in the classic mold of batch terminals, they typify one of the directions that communications is taking.

"Increasingly, it is becoming difficult for manufacturers to market any level of computer system without some sort of capability to transmit volumes of data; i.e., a remote batch transmission capability," Datapro explained.

Usage Patterns

Turning to usage patterns, the report said a majority of RBT users had IBM CPUs in the 370/155 category or larger.

IBM 370 mainframes smaller than the 155 accounted for 22.8% of the 415 computers mentioned by users surveyed.

The principal application of each terminal was dedicated batch processing, accounting for 76.2% of users' responses; 45.6% of the users said they utilized a transmission speed of 4,800 bit/sec.

The higher 9,600 bit/sec speed was one percentage point ahead of 2,400 bit/sec with 24.1%, the report said.

A majority of users employed leased voice-band communications facilities (59.4%), while dial-up lines comprised the remaining bulk of facility type with 40.9% of the survey responses, according to the report.

The 35-page report is available from Datapro at 1805 Underwood Blvd., Delran, N.J. 08075.

RJE Subsystem Links HP 1000 With Batch-Oriented 360/370

PALO ALTO, Calif. — Hewlett-Packard Co.(HP) has introduced a remote job entry (RJE) subsystem which allows the recently introduced HP 1000 series of computer systems to communicate with IBM 360/370 batch-oriented CPUs.

The RJE/1000 (HP 91780A) cassette tape software/hardware package increases the HP 1000's distributed processing capability by giving the remote user the power of an IBM batch system for large-scale computation and report generation and allowing large-scale data storage, according to an HP spokesman.

RJE/1000 works with the HP system under RTE II and III operating systems in a true multiprogramming environment that allows concurrent program development, computation and data acquisition while communicating to the larger batch computers, the spokesman explained.

Retrofits Possible

The RJE package can be retrofitted to operate in several other HP 2100- and HP 21MX-based systems, he added.

All peripherals such as line printers, magnetic tape units, disk drives, card readers and CRTs can be used as RJE devices to the IBM systems, communicating through modems at speeds up to 9,600 bit/sec, the spokesman claimed.

Using the IBM binary synchronous communications (Bisync) protocol, data is transmitted over dial-up or leased lines in either half- or full-duplex mode.

Special RJE/1000 features include Ebcdic transparency, auto turnaround, auto answer, multirecord transmission and end of media, he said.

RJE/1000 offers a choice of Ebcdic and Ascii code sets and can operate directly with Hasp in IBM's OS operating system.

The HP RJE subsystem costs $4,500. HP is at 1501 Page Mill Road, Palo Alto, Calif. 94304.

Interconnect Switch Offered

SUTTON, Neb. — Counterscan Systems has introduced a high-density interconnect switch which can interconnect any two of 256 data channels, the vendor said.

CMOS LSI transmission gates switch the channels when supplied with an address for each channel, according to Counterscan.

Complete address coding and address retention is included with the switch; the address interface reportedly is compatible with any addressing system.

Address selections may be changed up to 1 mHz; the switches will pass analog and digital data to 1 mHz at amplitudes of 30 volts, Counterscan said.

The interconnect switch sells for $1,600 from the company at P.O. Box 536, E. Highway 6, Sutton, Neb. 68979.

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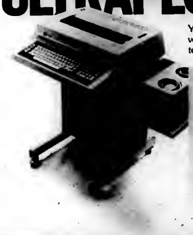

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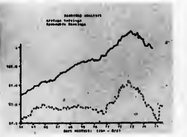

But there's still more. When you order the AJ 832 with Ultraplot you'll get AJ's Cal-Comp compatible FORTRAN software and a programming manual *at no additional charge.* Timesharing systems and in-house systems nationwide already have the software up and running.

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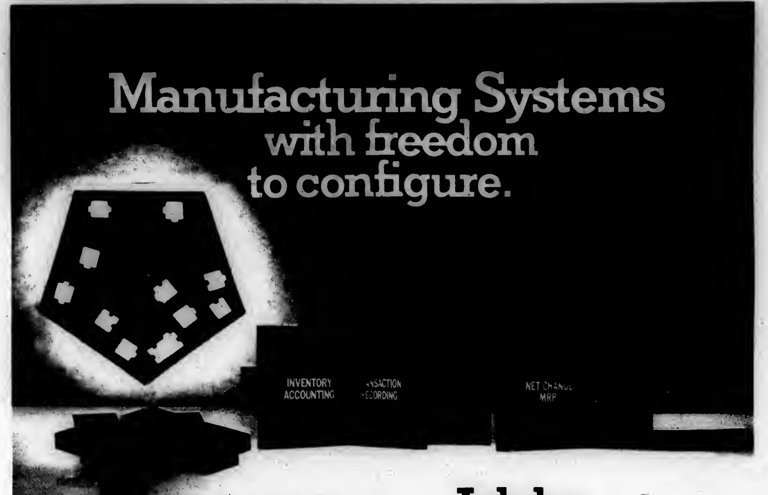

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ASC Designs Controllers For DEC, Other Equipment

ST. CLAIR SHORES, Mich. – Applied Systems Corp. (ASC) has introduced two communications controllers, one for Digital Equipment Corp. Decwriter terminals and the other for other vendors' equipment and networks.

Both ASC controllers utilize the Intel Corp. 8080 microprocessor systems and offer programmability and, in the case of the DEC terminal controller, buffer memory, ASC said.

The ASC unit for DEC LA36 or LA180 terminals controls communications with data networks operating at data rates up to 9,600 bit/sec using asynchronous or synchronous modems or computer interface adapters, the company said.

It provides communications protocol control, code conversion/editing and local DP or custom programming functions for one or more Decwriter terminals. It includes line adapters plus optional peripheral interfaces for CRTs, floppy disks or tape cassettes, ASC said.

A modular system architecture permits on-line operation of DEC terminals with medium- or high-speed networks. The controller provides optional features for multiple terminal clustering, block record transmission, error checking and modem control, the company stated.

Additional Features

ASC's Decwriter controller also features system compatibility for several communications line protocols by incorporating optional firmware routines for time-sharing, TWX, Telex, Decnet and IBM Bisync networks or others on either private-line or dial-up facilities.

It provides dedicated line control functions with interface capability for Bell and Bell-equivalent modems, although internal modems are available as a system option, according to the firm.

A multitasking executive program, special communications protocols and terminal control routines are also implemented in programmable read-only memory (Prom) firmware or can be executed from random-access memory (RAM), the spokesman noted.

In addition, he said, buffer storage and application program memory is available using RAM modules of 256 words up to 64K words.

The ASC controller for general equipment is also modularly designed for on-line operation with medium- or high-speed communications networks and incorporates interfaces for dial-up lines or private-line polling systems, he added.

It reportedly performs automatic control and buffering for one or more terminal devices. Optional analog and digital I/O is offered, ASC said.

This controller utilizes nonvolatile Prom for dedicated line control, operations and special communications protocols or station call routines.

RAM data buffer storage of 1K words is standard; options extend the storage to a maximum of 16K words, the spokesman added.

Typical terminal data rates include 110-, 300-, 1,200-, 2,400- and 4,800 bit/sec, with special features available.

The ASC controller for Decwriter terminal networks is priced at about $950 with nominal RAM. The controller for general equipment costs about $1,000, he said from 26401 Harper Ave., St. Clair Shores, Mich. 48081.

Multiplexer Links Terminals, PDP-11

OGDENSBURG, N.Y. – Up to 12 terminals or other peripherals can be interfaced directly to the Unibus of a Digital Equipment Corp. PDP-11 minicomputer with the GDS-2900 multiplexer system introduced by Goodwood Data Systems, the vendor said.

The GDS-2900 is a modular I/O subsystem allowing any RS-232-compatible asynchronous peripheral or terminal to interface up to four ports on the mini's Unibus either directly or through a modem, according to a Goodwood spokesman.

The multiplexer systems can be equipped for as few as four lines and can be expanded to the full 12-line capability in groups of four, he said.

Features such as the total number of data bits, stop bits, parity bits and line speeds – from 75- to 9,600 bit/sec – are all link-programmable for each individual line, the spokesman noted.

No line adapters or other equipment are needed for the GDS-2900 because modem control functions for Bell 103- and 202-type modems are a standard feature on all lines, he claimed.

A GDS-2900 master unit serving up to four ports on the PDP-11 costs $1,485; a second slave unit with additional four-port capability costs an additional $970.

Goodwood is located at Box 768, Ogdensburg, N.Y. 13669.

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Net Gets Crime Data to 'New York's Finest' Faster

By **John P. Hebert**
Of the CW Staff

NEW YORK — A computerized terminal communications system is making the jobs of New York City's uniformed officers easier by providing current information on criminal activities on city, state and national levels within one minute.

The New York Police Department's (NYPD) citywide Field Administrative Terminal Network (FATN) is also expected to save the department $510,000 annually in reduced labor, telephone and teletypewriter costs, according to Gene Snailer, FATN coordinator.

About 200 of the proposed 300 Olivetti Corp. TCV270 cluster-type CRT terminal systems with buffered printers have been installed in the NYPD's 73 precincts, seven area commands and certain administrative units.

The terminals are linked to dual IBM 370/158s which act as front ends to control the communications network and house the department's management information system (MIS), Snailer said.

Linked to Two Capitals

The network enables units within the department to communicate directly with each other and with a variety of law enforcement agencies in Albany, N.Y., and Washington, D.C.

Requests for information from agencies outside the NYPD are centralized through one Olivetti terminal to access Teletype Model 28s in Albany at 2,400 bit/sec over private lines, Snailer said.

No dial-up lines are used in FATN because "there's no way we can have chinks in our armor."

Through AT&T Dataspeed 40 terminals at the Albany-based New York State Police Inquiry Network, FATN users from the central location here can access the New York State Department of Criminal Justice Services file on all wanted criminals; the state Department of Motor Vehicles for drivers' licenses and registrations; and the Federal Bureau of Investigation's National Crime Information Center (NCIC).

The FATN terminal can also access the National Law Enforcement Telecommunications System and gain information on drivers' licenses and automobile registrations in 40 states; the network also connects NYPD's precincts and departments with the Special Police Radio Inquiry Network and the NYPD on-line management information system's programs and data.

Fast Inquiry Response

An officer in the station house can query the data banks directly and get a response in about 30 seconds, Snailer said.

Before FATN was operational, an officer had to make two phone calls for information, one to the General Warrant Division and one to the Identification section and then wait for call-backs from these units, which took between 30 minutes and two hours at times, he noted.

Aside from its faster inquiry response, the system has the capability for point-to-point message switching and to broadcast administrative messages; it also allows access to other NYPD systems, such as tracking and batch printout of "911" calls.

The dual 370/158 processors operate with a telecontroller system manufactured by Action Communication Systems, Inc., modems from Intertel, Inc. and lines supplied by New York Telephone.

An Intertel Model 500 centralized modem rack with a built-in network tester at the central site monitors each communications circuit and each station on the circuit so FATN users can see exactly where a problem may be, which Snailer said is very helpful in trouble shooting.

'Not Me' Problem

The Olivetti TCV270s and all other equipment on the network was chosen as a result of competitive bidding in 1973.

There were — and still are — the honest everyday problems of bringing and keeping up a communications network, although the biggest problem was the vendors saying "not me" when the small problems occurred, Snailer said.

"We got everybody to sit down and talk it out."

All of the vendors had problems, even though there was a lot of planning, site preparation and testing of the installed network, he added.

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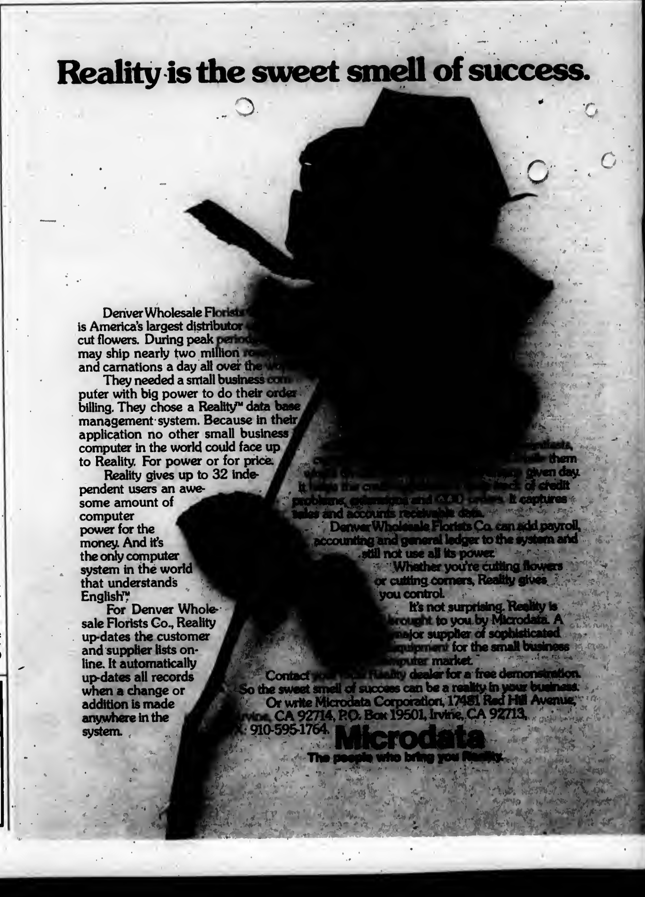

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Saves $500,000 in Carrying Costs

Sycor Borrows From Own Stock for Inventory System

ANN ARBOR, Mich. – With more than 15,000 part numbers including 1,000 manufactured items in its inventory, a manufacturer of computer terminals here faces many of the same problems as users.

Sycor, Inc. uses its own terminals, of course, in its in-house materials requirements planning (MRP) system. The system has reduced inventories and allowed the company to be more flexible, according to a Sycor spokesman.

And the terminal system has saved the company $500,000 in carrying costs – a direct result of turning the company's inventory over more quickly, he said.

"In a business like ours, for every $1 million you have in inventory, it takes nearly $250,000 a year in carrying costs to keep it there," Dick Phillips, vice-president of operations, explained.

"We've already been able to turn over our $12 million inventory another half-time a year since we initiated the program," he said.

The $50,000 MRP package from Software International runs on an IBM 370/135 with 512M-bytes on eight IBM disks and three tape drives.

Information on the firm's overall hardware requirements for the next six months as well as data on spare parts, supplies, options and peripherals needed is entered and edited for accuracy through six Sycor Model 340 terminals on-site in the manufacturing facility, the spokesman said.

Terminal Transactions

The information is then manipulated against a data base of bills of materials and a product structure file entered by the manufacturing engineering department which shows assemblies and subassemblies, he said.

Information is updated once a day by Model 340 terminals in the receiving area. Once items are received, the information is entered on the terminals with flexible disk options in the stocking area.

Exception reports produced as a result of the system help keep priorities straight, according to Marshall Smith, director of materials.

The system has given the company more control over its inventory so it can "act rather than react" to changing market requirements, he said.

"We still have shortages – and we probably always will because of engineering changes, vendor material problems, increased market demands or people simply forgetting to fill out the appropriate paperwork – but we are able to react faster in many cases and reduce the effect of delivery problems," he said.

The Sycor spokesman added there were very few problems with the system – and no problems at all dealing with the terminal vendor.

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Tektronix 4631 Gets Direct Print Option

BEAVERTON, Ore. – Tektronix, Inc. has a direct print option which it said allows alphanumeric information from a remote source to be transmitted via a Tektronix CRT terminal to a Model 4631 hard-copy unit, bypassing the terminal screen.

This reportedly enables the user to put five times as much data on one sheet of paper and to transmit it faster. It also allows multiple pages to be copied without operator intervention or CRT display disturbance, according to a Tektronix spokesman.

The direct print option can be used to receive information that originates either from a remote CPU or from an off-line source such as a Tektronix 4923 digital cartridge tape recorder, he said.

Prints at 787 Lime/Min

With the option, the 4631 hard-copy unit can print at speeds up to 787 line/min with up to 13,440 characters per page. This can result in copy cost savings where the data transmitted is primarily alphanumeric, plus savings in time, the company claimed.

The direct print option has its own character generator which provides two character sizes: 128 characters by 105 lines or 85 characters by 53 lines. The small character size requires a minimum data rate of 12 kbit/sec; the larger character size requires 4 kbit/sec.

The price of the direct print option is $1,000. Tektronix can be reached at P.O. Box 500, Beaverton, Ore. 97077.

CRA Has Silent 700 Keypad

LONGVIEW, Wash. – Cascade Research Associates' (CRA) Model Four Keypad was designed for users of Texas Instruments (TI) Silent 700 computer terminals without numeric clusters and for users in need of separate numeric keyboards with special layouts.

Utilization of a numeric keypad can speed up operators' productivity about four times over using the numeric keys on TI models 732, 733, 735 and 742 terminals with Microswitch keyboards, CRA claimed.

There are eight standard keypad layouts for the Model Four including line feed, carriage return, period, comma and other symbols, as well as numbers zero through nine. Custom layouts are also available, the firm said.

Options include a long cord for remote operation and automatic keying sequences. Versions with either 16 or 20 key positions are available with four or five columns of keys respectively, CRA noted.

Prices start at $200 for one and $185 each for two Model Fours in the 16-key-position version. Installation reportedly takes 15 sec to 30 sec.

CRA can be reached at P.O. Box 534, Longview, Wash. 98632.

CDI Adds APL, Ascii Miniterms

BURLINGTON, Mass. – Computer Devices, Inc. (CDI) has introduced a series of Miniterm portable time-sharing terminals for Ascii and APL operation.

The Miniterm Model 1203-APL comes with a built-in acoustic coupler and carrying case. A three-way keyboard allows the user to choose upper/lower case Ascii, APL and numerics only, according to a CDI spokesman.

CDI's desk-top Model 1202-APL features switch-selectable dual fonts, allowing the user to opt for APL or upper/lower case Ascii operation depending upon output requirements.

A third terminal, the 1201-APL, is a read-only thermal printing terminal said to be designed for all applications involving CRT terminals.

The 1201-APL also features dual-font printing in the full Ascii or APL character sets and is compatible with the IBM 5100 small-scale CPU, according to the spokesman.

A 1203 costs $2,435 or $137/mo; the 1202 costs $1,835 or $97/mo; and the 1201 read-only terminal costs $1,635 or $87/mo.

CDI is at 9 Ray Ave., P.O. Box 421 Burlington, Mass. 01803.

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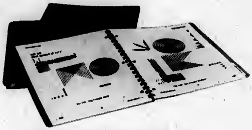

The 4662 contains its own character generator, alpha rotation, and page scaling, thus minimizing support software. Proven graphic and plotter software is provided by Tektronix.

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It's plug-to-plug compatible with virtually any RS-232 system . . . from minis to mainframes. You can plot circles around any other B-sized plotter, for about the same price as the competition.

Want immediate action on the 4662? Call toll-free: (800) 547-1880.

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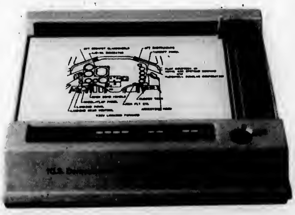

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Anticipation – Not Reaction – Key to Security

By **Ronald A. Frank**
Of the CW Staff

HANOVER, N.H. — The key to effective security in computer systems is to anticipate abuses instead of reacting to them after they occur, according to Donn B. Parker, senior information processing analyst at Stanford Research Institute.

Parker, an expert on computer abuse, said the only way to build effective security into a system is to anticipate beforehand how it can be compromised. At a time when technology is advancing rapidly, our control mechanisms are lagging behind, he warned at a recent Dartmouth symposium on "Man and the Computer."

As society puts more of its valuable assets into computer systems, the incidence of computer crime increases because criminals go where the money is. And this will happen before the five or more years needed to develop more foolproof security systems, Parker said.

The applications most susceptible to computer abuse in order of importance are banking, education, government, manufacturing, insurance and computer services.

In six years of studying cases of computer abuse, 430 incidents were identified. These totaled a yearly loss of about $10 million to $15 million. The average case in which data is accessed by unauthorized means costs the system owner $450,000, he said.

"And as on-line systems develop, we will be moving the vault door closer to the criminal," he cautioned.

Most of the systems which were studied to rate the effectiveness of their security had problems with either the manual I/O systems or the physical access. What is needed is more intensive risk analysis to spot potential security problems, Parker said.

In some cases, a computer system was found to have excessive security clustered in one area, leaving other areas vulnerable. This requires a shifting of some security mechanisms within the system, he said.

Computer security today is a fuzzy area because there are no accepted standards; the completion of standard codes of good practice for computers would be a step in the right direction, he suggested.

In the future, the incidence of computer abuse will probably decrease, but the value of the loss per occurrence will probably go up, Parker warned, because the danger to the criminal will increase.

At the same time, the average system will be exposed to a higher value of crime because the size and value of data bases are growing.

As transactions and security procedures are automated, there will be less exposure of assets to compromise, and the incidence of computer crime will drop.

Reader Has 'Clipped Character' Feature

Burroughs Enhances S1000 Series With OCR

DETROIT — Burroughs Corp. has added optical character recognition (OCR) capability on its S1000 series of data capture, transmission and document management systems.

The S1000s previously handled only magnetic ink character recognition (Micr)-coded documents.

The OCR document-reading capability of the S1000 models will provide more accuracy and time saving in the encoding and processing of documents for financial, commercial, industrial and governmental users, Burroughs claimed.

The S1000 models with OCR will enable users to process a variety of documents including remittance advices, utility bills, insurance premium notices, credit card slips and banking vouchers. All relevant OCR information can be captured and proved with one handling of the documents in a single pass through the S1000 systems, the firm said.

OCR fonts that can be read by the S1000s include OCR A/1428, OCR B/1403 and Farrington 7B. The OCR models can read any two of these fonts in any combination, according to a Burroughs spokesman.

'Clipped Character' Feature

The OCR reader incorporates a "clipped character" feature which enables it "in most cases to accurately read and interpret partially printed OCR numeric characters as long as 80% of the character is present," Burroughs said.

When a character cannot be read, a hold-and-view station programmatically stops the document in front of the operator and the display screen indicates any "can't read" or missing data. The operator can then index the character which will be inserted into the data to be captured, the spokesman explained.

This correction is accomplished with no manual handling of the document. This ability to capture complete data at the original document pass significantly reduces the cost of processing OCR documents, Burroughs claimed.

Three Models, Three Media

The equipment range of the S1000 series extends from an operator-attended two-pocket encoder to an operator-monitored, 20-pocket item-processing system with automatic feed, document reading, data capture, data communications and microfilm recording.

The OCR systems are the S1700, S1800 and S1900. All of these models utilize an integrated system and data communications processor, the same processor used by Burroughs' B80 small business computer.

This processor has 8K bytes of memory expandable in 4K-byte increments to 64K bytes.

All systems can transmit captured data to a central computer system by standard data communication methods, the spokesman added.

For storage of data captured during the document reading or encoding operation, the OCR models provide a choice of three media: one or two Burroughs minidisks, each with one million bytes of storage capacity; one or two industry-compatible minidisks, each with 243,000 bytes of storage or one to four magnetic tape cassettes, each providing 240,000 bytes of storage.

Microfilm Module

Burroughs also announced an in-line microfilm module for the S1000 systems which provides the ability to capture documents being processed through the system on film.

The 16mm film is cartridge-loaded in lengths of 100-, 200- or 400 ft. The images are reduced on film by a factor of 50 to 1 and recorded at an average density of 140 document/ft.

The operator console of the S1000 series has a 10-key numeric keyboard, a 21-column printer and an 18-cbaracter alphanumeric visual display for communications between the system and operator. A 25 char./sec Micr or OCR encoding module is available with all S1000 models.

An 85- or 160 line/min printer is optional on the S1000 systems. The printer can supply a hard copy of items processed on the S1000 and of all messages sent to the S1000 from a central computer system.

Each of the S1000 models with the OCR capability has "certain distinguishing features," Burroughs said. The basic S1700 has manual document feed, OCR code-line read, full-field encoding and endorsing.

The basic S1800 model has the same features as the S1700 witb the addition of an automatic document feed module, programmatic pocket selection and a sort speed of 120 document/min.

The basic S1900 has all of the features of the S1800 and can automatically fine-sort documents at up to 240 document/min.

A series of Burroughs standard application program products is available for use on each of the models in the S1000 series. Complementing the program products is a programming language called Encoder Programming Language (EPL).

EPL gives the user an opportunity to utilize a higher level language, eliminating costly program development and allowing the user to implement changes in S1000 programs without recompiling, according to the spokesman.

First deliveries of the S1700, S1800 and S1900 are scheduled for the second quarter of 1977. Purchase prices for typical configurations range from $45,400 or $1,265/mo to $64,036 or $1,750/mo.

As a Security Safeguard

Off-Site Storage Can Prevent Data Disasters

By **Laurence E. Tobin**
Special to Computerworld

- *A regianal Internal Revenue Service (IRS) installation near a majar airport last the cantents af a number af reels af computer tape containing thousands af tax returns. The tapes were erased by the actian af the airport's radar. It turned out that the metal shielding in the tape starage facility had been inadequately grounded.*
- *In December 1971, when the Arizona State Finance Center in Phoenix discavered one of its tape files had disappeared, it tried ta reconstruct the file from punch cards. Ta its dismay, it learned 2,000 af the DP cards had just been destrayed — folded, gilded and used as Christmas decorations.*

These are not isolated examples. They are occurring today with increasing frequency as information storage becomes more centralized. To all executives, not just DP managers, they are horror stories.

There is good cause for horror. Reconstructing files can be extraordinarily difficult and time-consuming or, in other words, expensive.

It's been estimated, for example, that it costs $25 to enter a name and related information on a credit card list. Since a tape may contain as many as 15,000 of these entries, the expense of putting Humpty Dumpty together again may reach $375,000.

Casualties like the IRS disaster and the gilded punch cards are pushing jittery management at large and small companies alike into audits of their DP security systems. The focus is on data, not hardware.

Many firms also are opting to keep a set of duplicate tapes and microfilm master negatives at off-site locations. An extra goad spurring the use of these off-site locations is the increasing federal requirements for corporate retention of records. It's becoming impractical to retain all that data in-house for years on end.

Establishment and perpetuation of an effective information security system is a new and unfamiliar responsibility for corporate management. But — as the above cases illustrate — the most valuable assets of many companies aren't plant and equipment or even inventories of raw material or finished goods.

It's their collection of magnetic tapes and microfilm negatives used by their DP facilities. They contain the data base and transaction information that are the lifeblood of the organization. They assure that business functions effectively and efficiently in a competitive environment.

Companies are seeking outside assistance and support services to help discharge management's responsibility for data security. Such a service should be designed to safeguard DP magnetic media and computer output microfilm negatives.

An integrated system for providing information security and creating a unique system security audit should also be included in the facility.

Monitored Atmosphere

The building's atmosphere should be monitored to maintain temperature and humidity standards that have been set by the American National Standards Institute (Ansi) to prevent damage to tape and film surfaces. Electrostatic air filtration should ensure a dust-free environment. And the structure must be free from the magnetic fields that wreaked havoc with the IRS tapes.

Confidentiality should also be a byword. The company should not reveal the names of firms retaining records in the building, because users do not want it known where their vital corporate records are located.

The emphasis should not be on dead storage. Unlike a commercial warehouse or bank, the facility should offer access to stored tapes, microfilm and disks on a daily basis, even on an hourly basis.

Effective Off-Site Installation

The location of current copies of data files at a specifically designated, specially designed off-site installation has proven to be the most efficient and cost-effective approach to assured protection. This file relocation removes critically necessary information from exposure to physical attack against the DP facility and places it beyond possible compromise.

The ideal site is one far enough from a company's DP center to avoid simultaneous exposure to disaster or civil disorder, yet close enough to allow prompt recovery within an hour or two.

Corporate management's use of off-site security facilities is an important element in a company's information asset protection plan.

Tobin is directar af Infarmation Security Services at Bonded Services, a New York-based data security facility.

System Saves Pennsylvania Auditors Time, Money

HARRISBURG, Pa. — The Department of Auditor General here has implemented a large-scale system to save time, money and manpower in the preparation of more than 16,000 fiscal audit examinations annually.

Use of the DP system is permitting auditors to reduce the time and cost of auditing while, at the same time, allowing expanded coverage of the audit assignments, according to Auditor General Robert P. Casey.

The system "will bring the utmost efficiency to the department's work and make more complete examinations practical," Casey said.

He pointed out Pennsylvania is currently "unique and foremost" among states using computers for auditing, adding he expects the system, based on a Univac 90/30 computer, will become a model for other state governments in utilizing DP for auditing.

By its charter, the Department of the Auditor General is responsible for the auditing of the financial affairs of any entity funded or financially aided by the commonwealth, including departments, boards, commissions, agencies, instrumentalities, authorities and institutions.

Most state agencies are audited annually. Additionally, numerous special audits are conducted on request of the governor, public officials and citizen groups. The department has about 700 employees, of whom approximately 560 are actually engaged in auditing.

Another significant example of the computer's use is the testing of commonwealth expenditures, according to Casey. Approximately 2.8 million expenditures were processed by state agencies this past year, a figure he indicated probably will continue to increase in the years ahead.

Testing Saved Time

"The testing of expenditures for the audit of the Department of Health alone saved 25 man-days," Casey said. Use of the computer also permits the auditing of other commonwealth agency DP installations to verify their transactions are complete and accurate.

"Since most state agencies process their expenditures by computer, it naturally makes good sense to audit the computer programs and DP equipment that produce the results," he remarked.

The management information systems (MIS) group in the department is responsible for auditing and evaluating commonwealth agency information systems and DP operations to ensure that they are properly and accurately performed, that each agency complies with commonwealth regulations in acquiring and using computer equipment and that they are achieving results through efficient and economical operations, Casey explained.

In one instance, DP auditors found one agency's manual accounting records reconciled while its computer records were more than $2 million out of balance. This was caused by a programming error and might never have been revealed if the computer programs and files had not been audited, he noted.

In terms of dollars, the department reviews the expenditures of more than $6 billion disbursed by state agencies and outside entities receiving state aid.

Encumbrances Unencumbered

The use of computers and special computer audit programs has drastically reduced the time and manpower needed for just gathering the basic information to perform the audits, according to Casey.

As an example, Casey cited the encumbrance audit which is conducted at the end of each fiscal year and involves the review of approximately 55,000 records. Encumbrances are commitments of current fiscal monies for specific purchases, contracts or services to be expanded during the next fiscal year.

At the end of the fiscal year, all unencumbered monies must be lapsed, that is, the unspent monies are returned to the commonwealth's surplus fund. The auditors must determine the validity of the encumbrances for all commonwealth departments, boards and commissions to make certain all committed funds are proper and all uncommited funds are returned to the commonwealth surplus fund.

"It used to take us at least six weeks and about 45 auditors to collect the data we needed to conduct our annual encumbrance audit. Now we process magnetic tapes containing each agency's encumbrance data and this has saved us 142 audit man-days," Casey said.

From the tapes, the auditors select those encumbrances to be checked, using established criteria, Casey explained. By printing this information for the auditors, he added, an enormous amount of clerical work normally required is eliminated, allowing the auditors to concentrate on more serious audit tasks.

Computer performance evaluations have proved to be very valuable to the organizations audited, he noted. In one case, a state computer installation was shown how to reduce its equipment expenditures by $87,000 a year.

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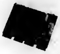

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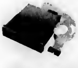

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Construction Management System Cuts Utility's Costs

By Richard W. Page
Special to Computerworld

A customer of the New York State Electric and Gas Corp. (NYSEG) calls the company's local service office:

"What are you doing about my request to provide electricity to the new home I'm building?"

The service representative turns to a computer terminal, enters the customer's name and town and obtains a display of the number assigned to the service request. He then keys in the number, and the display screen provides a full project status report.

The service representative can tell the customer all the necessary preparatory steps have been taken and the work is scheduled for Thursday, three days hence.

The time-saving directness of obtaining needed information and the customer's appreciation of getting it so quickly are but two positive results of the first stage of a highly valuable project at NYSEG — a long-term program to automate our construction management operations.

Using an IBM 370/158, the program's objective is to streamline and cut the costs of processing and reporting construction projects by lightening the paperwork burden, eliminating time-consuming manual tasks and quickly retrieving and reporting accurate information.

NYSEG followed with interest what other utility companies were doing to develop and implement computer-based systems for estimating construction costs, scheduling resources and controlling inventory.

A special study team noted our generating facility projects were always contracted and, while expenditures were high, only one or two projects were under way at any one time.

A pilot project was initiated for construction of overhead distribution facilities in one operating district. The underlying goal was to develop an on-line computer system utilizing remote CRT terminals and printers and centralized random-access files.

On the strength of six months of successful pilot operation, NYSEG management approved a proposal to develop and implement a statewide automated construction management system (CMS).

It would embrace both electric and gas facilities and include transmission and substation as well as distribution projects. A common data base would be used by all 16 operating districts.

To operate the system, we selected the IBM 370/158 located at our Ithaca headquarters. It runs under OS/VS2 and utilizes IMS/VS for the data base/data communication requirements.

We also utilize IBM's 3270 data communication system — 3277 CRTs and 3286 printers — for remote communications.

Development of the entire CMS program prior to implementing any part of it would have resulted in an extremely long development period without payback. Therefore, we decided to divide the program into several phases.

Phase I addressed the same general functions as the pilot system — plus provisions for handling underground and gas projects as well as automated posting and inventory control of all transformers.

The fact we chose to concentrate first on the distribution project workload is what makes NYSEG's construction management system different from most comparable efforts in the industry.

The CMS Phase I system handles operations of four departments within each of 16 district offices — engineering, construction, stores and continuing property records (CPR). Each department is equipped with CRT terminals and printers.

A field engineer visits a location, determines what's to be done and, using a predefined coding system, writes the job specifications on a field report form.

Back at headquarters, an engineering clerk takes the specifications to the department's terminal and enters them. The terminal edits the entries, checks that company standards are being followed and displays any errors detected.

After correcting any keying errors, the clerk requests a job analysis. The computer generates and prints this document which describes the work to be done.

The analysis, error report and field form are reviewed by the planner to assure the job has been defined properly. Then the clerk obtains a job estimate from the computer which is used to determine the management level at which the project must be approved.

When the system is told the job has been approved, it assigns a work order number according to the size of the job. Job papers are then forwarded to the construction department where a construction clerk enters the crew assignment and starting date.

To obtain material for the job, the construction clerk requests the system to generate and print requisitions for the required materials and selected options such as material type either by a portion or all of the job.

The computer again reviews the specifications and splits the desired materials out into the defined requisitions.

When the job is completed, surplus material is returned to the storeroom. The storekeeper inputs a record of this return, and the system prints out a salvage requisition showing the job credited accordingly. Salvaged material on a maintenance work order is similarly recorded.

Job Balanced

After all salvage requisitions have been issued, the system is called on to print out a balance sheet. This document compares items and quantities as specified by the planner with quantities issued and indicates whether the job is balanced within prescribed tolerances.

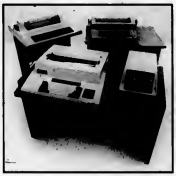
If it is not balanced, it cannot be sent to the CPR department until the cause of the imbalance is determined and corrected.

The balanced job is routed to the CPR department. A CPR clerk audits the paperwork for completeness and accuracy and then requests a computer "summary of units" report.

In addition, CPR obtains a computer printout that shows the entries to be made to the district's continuing property records. These printouts are organized by line and pole and show all units of property installed, including feet of conductor. (This operation will be automated in Phase 3.)

To meet information requirements of the state Public Service Commission, the CMS system also maintains a file giving the location and characteristics of the 260,000 distribution transformers owned by the company.

Page is manager of computer services at NYSEG.



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MINIWORLD

Mini Bits

HIS Adds Remote Upkeep For Series 60 Level 62

WALTHAM, Mass. – Honeywell Informstion Systems, Inc. (HIS) is providing its Series 60 Level 62 small-system users with Remote Maintenance Systems/62 (RMS/62) for remote diagnosis of problems.

With the system, which will be installed at most sites by year-end, engineers at the user's site will be able to get backup from other specialists, according to a spokesman.

Software problems can be analyzed and patches applied without the need for an emergency visit, the spokesman explained.

Users will need a telephone and Data Access Arrangement. Communications line charges will be paid by HIS, he stated.

The RMS/62 includes a remote console interface adapter which duplicates the functions of the operator console and a software diagnostic package.

HIS is at 200 Smith St., Waltham, Mass. 02154.

AEL Links Recorder, PDP-11

LANSDALE, Pa. – American Electronic Laboratories, Inc. (AEL) has designed the Model PTR/PDP-11 interface module to provide a link between AEL's pulse and transient recorder and Digital Equipment Corp.'s PDP-11 minicomputers.

The unit plugs into the small peripheral controller slot of the minicomputer.

The PTR/PDP-11 costs $1,075 from AEL at P.O. Box 552, Lansdale, Pa. 19446.

MDB Has LSI-11 Backplane

ORANGE, Calif. – MDB Systems, Inc. has a double-capacity backplane assembly housing eight quad or 16 dual modules for the Digital Equipment Corp. LSI-11.

Also available is an expander chassis with cooling, front panel and optional power supply, the firm said.

The backplane/cardguide assembly is priced at $295; the expander chassis costs $350. MDB is at 1995 N. Batavia St., Orange, Calif. 92665.

Power Supply Offered for Floppies

SANTA ANA, Calif. – Standard Power, Inc. has a line of multiple output, regulated dc power supplies designed for use in floppy disk, magnetic tape and cartridge tape systems.

Open frame construction allows convection cooling, the company noted. The power supplies cost about $109 from Standard Power at 1400 S. Village Way, Santa Ana, Calif. 92705.

First User of DEC System

Galaxy/5 Helps Service Keep Clients

By Esther Surden
Of the CW Staff

CHAMBERSBURG, Pa. – The first user of a Digital Systems Corp. (DSC) Galaxy/5 system said the on-line minicomputer is helping his service bureau offer real-time capabilities at lower cost to its users.

Computer Assistance, Inc., which has been in business for six years, was beginning to feel the squeeze of small users going to their own small business systems, according to Bill Kelly, vice-president in charge of operations.

"As our customers began to grow, they started looking at their own in-house systems. With this system we now can offer them almost an in-house system of their own, without any worries about programming and analysis," at a cost-effective price, he said.

The firm began to look around for a system to augment the IBM 3/10 it uses for batch operations.

Systems from Burroughs and IBM were considered as well as the Galaxy.

"We looked at other systems that would let us do the same thing but the price wouldn't let us offer the service to our customers at a price we felt was reasonable," he said.

The firm settled on the Galaxy/5 system based on its confidence in the manufacturer and its projected ability to perform in a cost-efficient manner, Kelly noted.

The Galaxy/5 configuration includes 64K of memory, two 65M-byte disk drives, one 200 line/min printer in-house and two more remote, and about six CRTs located in users' offices, he said.

The 3/10 has 16K of memory with 10K of disk, a 200 line/min printer and a card unit, he said.

Currently the 3/10 is running "about 60% payroll and the rest odds and ends," while the Galaxy is handling a few on-line applications. The Galaxy system is partially up with four customers on-line, but will not be fully operational until the end of the year, he noted.

Applications currently running on the Galaxy range from a complete grading system for a local high school to accounts receivable for local manufacturers.

The bureau has about 60 customers, Kelly added.

'Working Fine'

"The Galaxy has been working fine. The response times are almost unbelievable on some of the operations, comparing those with the IBM/3 which I'm most familiar with," Kelly said.

"In the assembly programs and some of the sort operations, there is quite a significant difference in time. Although we've only had up to five people using the system at one time, there has been no degradation of response.

"I don't know what it [the response time] will be once we get 15 or 20 CRTs on-line, however," he said.

The system cost about $92,000 excluding the software.

Service for the Galaxy is handled by DSC from its Frederick, Md., office, he noted. The bureau expects to keep pluggable parts available for system failure and to be able to run self-diagnosis to keep maintenance costs down in the future, he said.

Users treat the system almost like timesharing. They enter data in their offices. The service bureau massages it and returns the necessary documents to the user, Kelly said.

Most users can be taught to use the CRT in a half hour, he said, because of a prompting package that leads them through the work.

DEC Extends Datasystem Line With Two Entry-Level Machines

MAYNARD, Mass. – Digital Equipment Corp. has introduced an entry-level small business series of systems in its Datasystem line.

Two models of the Datasystem 320 series were announced.

The 322, housed in a desk, uses a floppy disk media for program and data storage. The 324, housed in a cabinet, uses disk packs for its storage and program media, according to a spokesman.

Both models include a CRT and a medium-speed dot matrix output printer.

Software for the 320 series includes DEC's Business-Oriented Language (Dibol) which runs under the CTS-300 operating system. Programs developed for the 320 series can be run without modification on the Datasystem 350 series and without source modifications on the 500, the spokesman stated.

The 320 systems can be used in distributed nets through the use of communications interfaces, he added.

A typical 322 includes 32K bytes of memory expandable to 56K, 512K bytes of floppy disk, a VT52 CRT and an LA180 dot matrix printer.

The 322 can include a controller and eight drives for RK05 disk packs for a maximum additional storage of 19.2M bytes. The disks are housed in a separate cabinet, DEC said.

The 322 can also accept a second dual floppy disk drive for a total of 512K bytes of storage, it added.

The typical Datasystem 324 has 32K bytes of memory, 7.2M bytes of disk, a VT52 terminal and an LA180 printer. It can be expanded with another 24K bytes of memory, additional terminals, a second printer and additional floppy disk and disk storage, DEC said.

The typical 322 system costs $20,900 with software support while the 324 system costs $34,000. The systems will be available next spring.

B80 Software Priced Separately

CHERRY HILL, N.J. – The most important part of the Burroughs B80 announcement was "Burroughs' new policy of pricing operating system software separately from the hardware and of making such software nontransferable by the purchaser," according to Mansgement Information Corp. (MIC).

"When a user with a purchased B80 wants to sell it to another user, he cannot sell the operating system with it. Instead, the buyer will have to negotiate a new license agreement with Burroughs," MIC said in a spotlight report on the system.

"While Burroughs doesn't see any problem with B80 resale, we advise you to read the contract carefully particularly with respect to any restrictions to your rights to resell the system.

"Can you sell the machine without the operating system? Would you be forced to trade it in for another Burroughs system?" MIC asked users.

The B80 marked a recognition by Burroughs of the need for a multiterminal transaction-oriented processing system that is attractively priced, MIC noted.

The system features "complete upward software compatibility with the . . . B1800 and the large '800' series computers. This is a key attribute that Burroughs management has insisted upon," the report continued.

The complete report is available from MIC at 140 Barclay Center, Cherry Hill, N.J. 08034.

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Clothes Maker Ends Service Use, Goes In-House for Timely Data

LOS ANGELES — An in-house minicomputer at Peggy Lou Co., a manufacturer of women's sportswear here, has replaced a service bureau to provide "up-to-the-minute information," according to Bob Malouf, secretary-treasurer of the firm.

"When you use a service bureau there's a time lag; with our system, the interactive capability gives us information as current as the last transaction.

"By typing a request on the typewriter-like keyboard, the answer will be flashed on a CRT. Being able to 'talk' to our computer at any time gives our data a timeliness that just wasn't possible with a service bureau," Malouf said.

The Basic/Four Model 400 in use at Peggy Lou consists of a CPU, three CRTs, 8.4M bytes of on-line disk storage and a 300 line/min printer. It cost about $65,000 initially.

While the clothing manufacturer uses the small business computer for most of its standard office accounting functions such as order entry, accounts payable and general ledger, it finds the system pays off mainly in special applications tailored to the specific needs of the garment industry, Malouf said.

"We have one computer program, for example, where we input exactly how many yards are available of a particular piece of material in a given shade. Then the system determines bow many of each and what style can be made up and which styles go to which customer," he explained.

Advantage of Expandability

In addition to its interactive capability, another advantage of the small business system is expandability, Malouf said.

"At the present time, we're inputting data in order to develop a base for sales analysis by salesman, customer and style. We'll be able to track items by account, style, price and date sold.

"And once we've established the data base, we will be able to create a wide variety of meaningful comparisons and projections for the future," he said.

No one in the Peggy Lou office had a formal DP background, according to Malouf. "Although the one person who is in charge of inputting data into the computer attended a training program, none of our supervisors did — and they all use the CRTs for requesting information."

The system was chosen from five or six available from vendors including Burroughs, Singer and Qantel, Malouf said. "We went out to the vendors' local offices and visited some users in the area. Basic/Four had a lot of systems in the garment industry in northern California," he noted.

A deciding factor was the software supplier, he added. "We saw Basic/Four and SUM Co. at a local trade show," Malouf said. He added that the company is more than satisfied with the software from SUM.

The software has cost less than $20,000, he said.

As far as savings go, Malouf said the overall cost is less than a service bureau because the company is getting more from its own system than it did with the outside bureau.

"Although our accounting staff has remained the same in number, we are handling a great deal more data and generating a lot more reports and information than we did previously," he said.

Techtran Floppy Disk Can Operate On-Line

ROCHESTER, N.Y. — The Model 9512 Micro Disk floppy disk system from Techtran Industries, Inc. can be operated remotely to a CPU, the vendor said.

The system, which uses magnetic diskettes that hold more than 250K characters each, can be used off-line for data entry, high-density storage or file retrieval and update, according to a spokesman.

On-line, the system can perform as a communications terminal for data input, output and editing functions, he added.

High-speed random access of data files by location or character string are additional features, the company said.

RS-232C interfaces and dual connectors are included for use with terminals, minicomputers, modems and time-sharing systems at switch-selectable data rates from 110- to 9,600 bit/sec.

Track and sector address, character string search and selectable stop codes are also included, Techtran said.

The Model 9512 costs $2,595 from 580 Jefferson Road, Rochester, N.Y. 14623.

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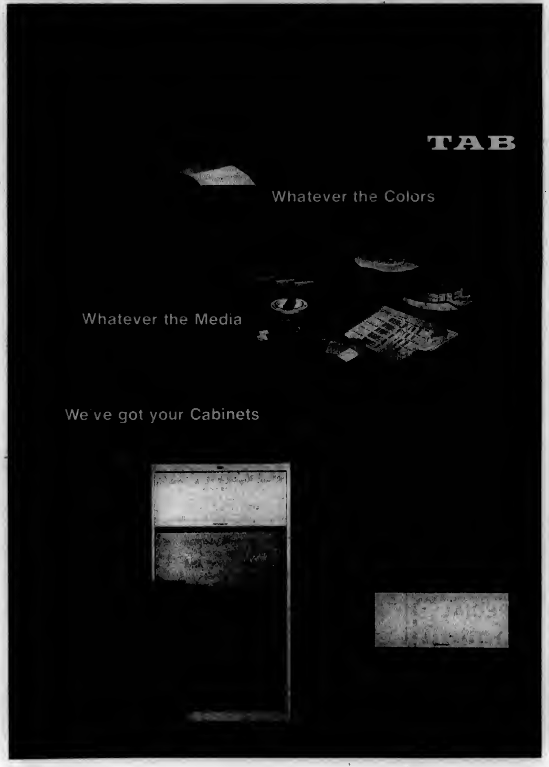

At Core of 70-Story Network

Three Minis Helping to Manage World's Tallest Hotel

By John P. Hebert
Of the CW Staff

ATLANTA — The management of the world's tallest hotel turned to a minicomputer-based system to support its dispersed offices and work areas.

The physical structure of the Peachtree Plaza Hotel here demanded a more sophisticated management tool than conventional means could offer, according to Lawrence A. Dustin, executive assistant manager of the 70-story, 1,100-room building.

Because of the hotel's design, Western International Hotels' management realized it needed good avenues of communication between the administrative work centers, shops and restaurants spread out over the hotel lobby's five floors to ensure smooth operation, Dustin said.

Management also felt it had a responsibility to Peachtree Plaza's architect/owner/developer, John Portman & Associates, to recommend and utilize systems which would be more profitable than any manual system could have been, he recalled.

Two 256K IBM 3/15 CPUs carry the processing load for guest accounting functions, accumulation and tracking of guest charges and for actual registration and checkout, Terry Hughes, DP manager, noted.

Another mainframe, a 52K IBM 7 connected to the 3/15s, serves as an information base for all of the Touch-Tone-type telephones in the hotel, Hughes said. On this CPU, data on guest telephone charges is captured, formatted and then transmitted to the primary 3/15.

A network of 25 IBM 3277 CRTs and six IBM 3286 printer terminals are located primarily in the registration/checkout area, but also can be found in the restaurants and other in-house retail sites operated by hotel management, according to Hughes.

Phone charges are received from Southern Bell Telephone Co. and put directly into the IBM 7. This information, Hughes said, is used to update the data on the 3/15.

A second function of the IBM 7 is to satisfy the needs of a large housekeeping department.

This system lets management know if the guest rooms have been cleaned and whether guests have packed up and left.

In addition, guests' wake-up calls are keyed into the primary 3/15 and, at 2:30 a.m., the requests are run through a software program and calculated in reverse order to determine the order of calls in the morning.

This information is then transferred from the 3/15 to the 7 system and executed at the appropriate time through an IBM communications line arrangement, Hughes said.

The wake-up calls are computer-controlled: a taped message lets the guest know the time and the outside air temperature and suggests trying one of the hotel's restaurants for breakfast.

The system has a 40-call capability each minute, he added.

The primary 3/15 is also used to document hotel employee entry and exit times. The data, Hughes said, is used to authorize all employees for particular job-related areas within the hotel.

The second 3/15 is predominantly a batch machine which serves as backup to the primary, Hughes said, adding it can be switched to perform the duties of the primary CPU in five minutes.

The secondary 3/15 is used for payroll, general ledger and general administrative functions in the hotel, according to Dustin.

The system includes two IBM 3340 disk drives for each 3/15, amounting to 100M bytes of storage, and two tape drives, one from IBM and the other from Pertec Computer Corp., which are used as part of an interface to the United Airlines computer center and central reservation system in Denver; an Incoterm CRT terminal feeds the information to the reservations net.

Western International management initially looked at different computer equipment vendors before turning to IBM.

It chose IBM, he said, because of reliability, high caliber of personnel, accessibility to IBM's General Systems Division, which is headquartered here in Atlanta, and because it could answer the question of "where the vendor would be in a few years."

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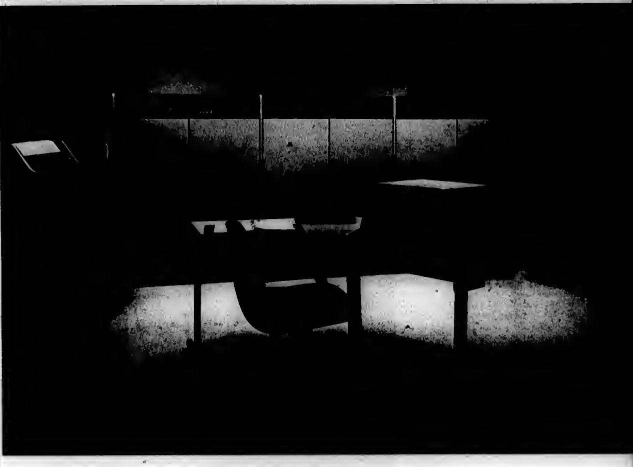

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Calculators Take Manufacturer's DP to Sales Level

SAN MARCOS, Texas — A manufacturer of large-scale lighting fixtures here has extended DP to the sales level with computing and programmable calculators.

The firm, which uses an IBM 3 batch mini for its accounting functions and is presently using time-sharing for its engineering DP needs, is providing its sales force with programs for its Hewlett-Packard (HP) 65 programmable calculators, according to C.J. Eagan, director of application engineering.

Widelite Corp. has manufacturing and sales operations in Europe, Australia, Canada and Mexico and currently is using about 70 of the $795 programmable calculators.

Each sales representative gets a binder with 125 magnetic preprogrammed cards for calculations involved in lighting design.

"We were looking for something we could give the representatives for quick calculations, and the HP 65 had just come out. Several of the reps expressed interest in buying the calculators if we would provide the programs," Eagan recalled.

The engineering department expects to extend its DP capability shortly with the installation of a Prime 400 minicomputer to replace the time-sharing, he added.

The "field" HP-65s have played an important role in the success of one of Widelite's major products.

Automatic energy control (AEC) uses a photocell to control the brightness of lighting systems.

As lights age and gather dust, they gradually lose intensity. The traditional solution has been to set a minimum level and purchase lights with an intensity far above it; then, as the lights lose their brightness and approach the minimum level, they are replaced.

Using Widelite AEC, the photocell continuously monitors the lighting level, dimming and brightening the lights to retain the optimum level. When the lights can no longer be brightened to the proper intensity, an indicator light on the AEC panel notifies the operator of the need for a change.

Using AEC can be very efficient, Eagan said. For example, a manufacturing plant with 500 luminaires of 1,000-watt sodium burning 24 hours per day in dirty conditions can save up to $20,000 each year with AEC reducing energy consumption by over one million kilowatt-hours.

The HP 65 allows Widelite representatives on-site to take variables on wattage, type of lamp, dirtiness of environment and annual hours of use to give savings of equipment and energy and to design the most efficient lighting configuration, Eagan said.

Resourcefulness in Use

Some sales offices have three or four HP 65s. Many of the sales representatives have shown considerable resourcefulness in their use of the calculators, Eagan said.

"We feel the combination of computers and calculators gives us the capability to use the efficient amount of DP power on any given problem. Mathematical operations that are not overly complex but require quick answers can be handled in the field by the HP 65s," Eagan said.

"Large problems of design and implementation needing extensive manipulation and a less restrictive time limit can be accomplished by the batch computers.

"We can't begin to estimate how much money and time the calculators have saved this company," he added, pointing to one salesman.

"The ability of the HP 65 to yield quick and accurate data saved one of his sales and landed another. He saved the sale by convincing an engineer with on-the-spot facts that he should stick to original specifications.

"He landed the other sale by being able to give the correct data to a designer who needed it right away."

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Milgo Plans to Sell Common To UK's Racal Electronics

MIAMI — Milgo Electronic Corp. has reached an agreement to sell 312,000 shares of its common stock to Racal Electronics Ltd., a British communications equipment manufacturer.

Milgo will receive $6.7 million from the sale of stock and will use the proceeds to reduce bank borrowings, according to Monroe A. Miller, Milgo president.

The agreement is totally unrelated to two recent acquisition offers from Applied Digital Data Systems [CW, Nov.22], he added.

Milgo reported earnings of $2.4 million or $1.35 a share on revenues of $41 million for the year ended Sept. 30 compared with earnings of $4.2 million or $2.50 a share on revenues of $40 million a year ago.

Lear Siegler Plans Terminal

SANTA MONICA, Calif. — Lear Siegler, Inc.'s Data Products Group plans to have an intelligent terminal with arithmetic capability next year, according to group manager Lee Falco.

The unit will also feature user programmability beyond that found in the firm's semiintelligent ADM-2, he said.

Supershorts

NCR Corp. and the USSR have signed five-year agreements aimed at the application of electronic retail systems in Soviet department stores, supermarkets and restaurants.

— — —

Shugart Associates has signed a two-year OEM agreement with Computer Automation to supply that firm with SA800 floppy disk drives. The floppies will be used in minicomputer software development systems and automated digital logic module testers.

— — —

Data 100 Ltd. has appointed Ashworth Automation Ltd. as its Canadian distributor of magnetic disk drives, horizontal-belt line printers and core memory modules.

— — —

The National Association of Independent Computer Companies (Naicc) has been formed for independent computer OEMs and distributors. Information is available from P.O. Box 75095, Cincinnati, Ohio 45272.

Because of Amdahl, Itel Inroads

Study Expects IBM Anti-PCM Strategies

By Toni Wiseman
Of the CW Staff

MENLO PARK, Calif. — With the recent announcement of Itel's Advanced Systems and the inroads being made by Amdahl Corp., IBM is likely to implement some strategies to counter the plug-compatible manufacturers' (PCM) mainframe threat, according to Input.

A recent study by Input examined the possible IBM strategies, specifically with regard to Amdahl, and Amdahl counterstrategies.

In the short term, the major step IBM has taken is the announced 370/158 upgrade, designed to fill the hole in that line's price/performance, according to Input.

The study did not see IBM bringing out "fighting machines." At this high end of the spectrum, such a venture would be very expensive and, based on IBM's less than spectacular past history of fighting machines (the 360/22, 44 and 67), does not appear to be a good idea, the report indicated.

Beyond the 370/168-3, the study also did not foresee any substantial increases in IBM's price/performance in the short-term — the next 18 months — based on the difficulty of getting the hardware ready.

30% Price Cuts Possible

Rather than improving performance, IBM would be more likely to cut the system price, for instance by lowering the cost of memory, to combat the PCM threat, the report said.

If IBM were to both cut memory price and integrate channels into the CPU, it could cut system prices to the user by 30%, Input estimated.

But if IBM takes this course, it will also impact its own revenue base; the question arises as to how much erosion IBM is willing to tolerate, the study noted.

Input suggested the giant will probably allow Amdahl to get 20%, the PCM penetration it has traditionally tolerated.

In terms of systems threatened by Amdahl's 470V/6, IBM had 2,225 such systems installed in the U.S. and 1,272 abroad at the end of 1975.

If Amdahl were to reach the 20% penetration mark of the current installed base, its base would represent 445 systems in the U.S. and 254 systems internationally, according to Input.

Looking toward 1980, Input predicted IBM would have 3,840 systems in the U.S. and 3,521 abroad. A 20% penetration would mean 768 U.S. systems and 700 abroad for Amdahl.

The 20% figure is, however, probably a high estimate, according to Michael P. Burwen, Input's director of marketing. But even figuring medium penetration, Amdahl could count on an installed base of 380 systems or 185 with low penetration, he said.

Thus, in the short term, IBM's only counterstrategies would be to lower memory prices, integrate data channels and increase the size of high-speed buffers, according to Input.

More Time, More Options

Over the next 12 to 24 months, however, the picture will change drastically, offering IBM several options.

These include modification of 158/168 architecture by converting the mainframe into a series of multifunctional processors and utilizing relocatable control storage to put OS kernels into long-range function to decrease system overhead, the report stated.

IBM could also utilize new memory technology (such as bubble, or charge-coupled devices) to lower prices, unbundle prices of hardware operating systems, put OS software into hardware and take advantage of new component technology to decrease the number of components in the package, Input noted.

What can Amdahl do? The biggest step Amdahl can take to maintain its revenue base is to go into the peripherals business, the report suggested.

This would be easily possible through Amdahl's tie-in with Fujitsu, it added.

Amdahl's strategy should therefore be to influence customers to use plug-compatible peripherals either from other third parties in the short term or from Amdahl itself in the long term in order to lessen users' dependence on IBM.

Breakeven Point

Amdahl's viability in the long run does not seem to be in jeopardy, Burwen said. The firm's breakeven point is one machine per month and it is currently turning out four monthly.

The problem is in sufficient test equipment to get the computers out to the users, he said. Amdahl currently has a backlog of several months' orders and "there doesn't seem to be any end to it in the short term," Burwen said.

In addition, Amdahl has Fujitsu's money behind it.

And, as a final point in its favor, Amdahl has sold numerous machines to AT&T which will therefore probably be as supportive as possible to see that Amdahl survives in the long term, he added.

The report, entitled "Amdahl as a Viable Alternative to IBM," is available from Input at Suite 320, 2180 Sand Hill Road, Menlo Park, Calif. 94025.

IBM Restructured Equipment To Counter PCMs: Calcomp

By Molly Upton
Of the CW Staff

LOS ANGELES — Jurors in the trial of California Computer Products, Inc. (Calcomp) vs. IBM were presented with an encapsulated version of IBM actions to prevent further incursions by plug-compatible manufacturers (PCM) into its installed base.

During the action-packed years — 1970 through 1972 — IBM reworked its Model 2314 drives into a "kluge" that offered a 25% price reduction per spindle and incorporated some of the controller functions into the CPU and one of the drives, Calcomp attorney Max Blecher said in quoting an IBM memo in his opening argument.

First introduced for the 370/135 and 145, the same scheme was used to combat PCM activity in the 360 area; these models were known as the 2319A and B respectively, Blecher said.

The Fixed Term Plan, initiated in May 1971, offered users 8% and 16% reductions for one and two years respectively and also locked in customers, especially 3330 users, who might otherwise have been prospects for PCM gear, he said.

Although IBM initially lost revenues on the plan, as illustrated by internal documents, the scheme served to reduce PCM business and make it increasingly difficult for PCMs to procure financing, he said.

IBM later offered an Extended Term Plan

(Continued on Page 44)

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Wyly Holders Opt for Recapitalization Over Bankruptcy

DALLAS — When Wyly Corp. shareholders met for their annual meeting here recently, they were faced with a tough decision — whether to vote for or against a reorganization plan which Sam Wyly described as the only alternative to Wyly's total bankruptcy.

They opted for recapitalization and projected profitability in 1977.

"Our massive losses (aggregating approximately $135 million during the last two and one half years), principally from the fire and casualty insurance business and [the Data Transmission Co. (Datran)], have resulted in a crippling deficit net worth," Wyly said.

"The insurance business has been sold and Datran has declared bankruptcy, but Wyly Corp.'s financial condition and prospects are too precarious to survive without recapitalization," he asserted.

Wyly's "Plan of Recapitalization" calls for the exchange of approximately $39 million of subordinated 7-1/4% debentures for 25 shares of Wyly common and 20 shares of Wyly Series A convertible preferred stock for each $1,000 principal amount plus cancellation of accrued interest thereon.

Some $11 million of 4% capital notes will also be exchanged for 30 shares of common and 22 shares of Series A preferred under the same terms.

Additionally, outstanding Walter Haefner Holding AG securities, including investment in Wyly and Datran of approximately $55 million, of which at least $45 million is a senior secured claim, will be exchanged.

The exchange will entail Wyly common stock representing approximately an initial 47% of the Wyly common stock.

Finally, Wyly is calling for a reverse one-for-two common stock split, reducing the number of issues shared to 4,302,680.

Proxy Outlines Risks

According to a proxy statement, the board of directors of Wyly also concluded the recapitalization plan was the only realistic alternative available to Wyly.

If the plan cannot be consummated, Wyly will, in all probability, be forced into bankruptcy, the board of directors said.

They noted, however, that because the plan of recapitalization "is subject to numerous contingencies," even if it is approved by Wyly stockholders "there is no assurance the plan can ultimately be consummated."

The prospectus further noted that "if the plan of recapitalization is consummated, the securities of Wyly will continue to involve a high degree of risk. It is difficult to call attention to all of the possible risks involving Wyly or to indicate their relative importance."

Allen & Co., Wyly's accountant, did list eight risk factors, ranging from the uncertainties concerning Wyly's ability to continue operations to management turnover.

It pointed out, for example, that Datran, in which Wyly Corp. has 86% ownership, has gone into bankruptcy, resulting in a loss of $53.2 million. Furthermore, "Wyly does not anticipate recovering any of its investment in Datran through the liquidation of Datran."

While the accountants indicated Wyly has no contractual liability for Datran's debts, they said certain creditors might attempt to assert such a claim and at least one has.

Another risk mentioned was "significant overhead costs." There is no assurance Wyly will be able to reduce these costs "to a level commensurate with its ongoing data processing operations.

"In addition, during the current year, Wyly has incurred and is continuing to incur substantial expenses in connection with the plan of recapitalization, and Wyly anticipates incurring substantial expenses with respect to its antitrust lawsuit against AT&T for a significant number of years."

Uncertainties relating to University Computing Co. (UCC) were also cited as a risk since, while UCC's foreign operations have been profitable, its domestic operations have been only "marginally" profitable.

"However, foreign operations are subject to the risks relating to fluctuations in foreign currencies and restrictions exist as to the repatriation of earnings derived from foreign operations," the accountants said.

"That portion of domestic operations represented by UCC's banking software has been unprofitable on an annual basis since 1973 and continued to be unprofitable for the six months ended June 30, 1976," the prospectus stated.

The prospectus further noted there is no assurance of dividends or sinking fund payments on the Series A preferred stock and, in the past 12 months, a number of management executives — including the chief financial, accounting and legal officers and UCC's chief executive officer — have resigned.

Final risk factors include UCC's extreme dependence on its staff of trained technical employees, the loss of which would have a "materially adverse" effect on UCC, and the fact that Wyly's DP business may be adversely affected by technological advances since "UCC's software is designed principally to operate on computers manufactured by IBM and a majority of its DP services are provided on computers which are not of the most technologically advanced design."

SDC Set to Market Ampex TBM Systems

SANTA MONICA, Calif. — Ampex Corp. and System Development Corp. (SDC) jointly announced an agreement in which SDC will have the exclusive right to market the Ampex TBM mass storage system worldwide.

Ampex will continue to market its TBM equipment to computer mainframe manufacturers on an OEM basis.

Under the agreement, SDC will purchase TBM data storage equipment from Ampex. SDC will then develop mass storage systems for its customers.

Earlier this year SDC named Ampex to provide a $1.8 million TBM system for use in the Tiros-N weather satellite program slated for introduction in 1978 by the National Oceanographic and Atmospheric Administration.

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IBM Restructured Devices as Anti-PCM Move: Calcomp

(Continued from Page 42)

which gave a 16% discount on a two-year plan and eliminated the use charge. Users could renew on a one-year basis.

Although the documents Blecher showed the jury during his opening statement are not yet admitted as evidence, they give some indication of what will be seen as the trial progresses.

An October 1968 presentation to IBM's management committee indicated "OEMs [were] here to stay, but their growth rate in the future [would] be controlled significantly by IBM's product strategy."

Calcomp contends these actions were designed to and did inhibit and virtually destroy the PCM group.

IBM acknowledged "competitive OEM products are characterized by superior performance, access time and lower rental/purchase than IBM," Blecher said.

In January 1970, a person was assigned to find a solution to the PCM problem since "they are killing us on 2311s," one document said.

An IBM listing of the number of accounts installed in April 1971 ranked Telex first followed by Memorex, Potter and Calcomp/Century.

Memorex had the lowest selling price and was obtaining the most new accounts, according to IBM documents.

IBM recognized PCMs were offering users annual savings compared with IBM prices of between 21% for a 360/30 to 26% for a 360/65. This amounted to $23,388 and $191,730 respectively.

Reuse of 2314

By March 1970, the management committee declared peripherals a "key corporate strategic issue" and assigned a task force to recommend actions on peripherals, which did not then include terminals.

The task force's solution was a "possible recommendation by reusing 2314 disk drives in a three-file kluge." The code name for this product, which became the 2319A, was "Mallard."

"Mallard is a three-drive 2313 with electronics added for native attachment to CPU models of the [360/135 and 145]," IBM said in a document.

In July, IBM assessed Memorex and Telex as viable. "They are viable, they will erode IBM's tape and file lease business . . ."

The head of IBM's San Jose laboratory, J.D.Kuehler, described Mallard as "not actually a new machine," although it would appear to be, Blecher said.

"The hardware contents of the file is to have design and reuse of parts dating back several years," Kuehler wrote in an August 1970 memo.

"The 2319 drives are not visually recognizable as they are bolted together with other drives of the series and visually bear no unique identity," Kuehler said.

The Mallard system eliminated the controller box — a high profit item for PCMs — by splitting the controller's functions between the CPU and the three-spindle disk drive, Blecher said.

The 2319A cut well below the PCM price, he added. The 2319A rented for $2,805/mo while the PCM gear cost $3,650/mo in comparison with the original IBM 2314 price of $4,559/mo.

Blecher contended a good part of the reduced revenues were recoupled through prices on the 135 and 145.

IBM did essentially the same thing with the 2319B for 360s in December 1970, Blecher said.

Within 30 days of IBM's December 1970 2319B announcement, Telex was nearly down to the IBM price and the others were expected to follow, IBM noticed.

Although in January T. Vincent Learson had opposed price hikes in CPUs and another executive had argued against long-term lease plans, IBM initiated its Fixed Term Plan by the end of May.

Less than a month later, it raised prices on CPUs. A memo written at that time indicated the net effect of the combined actions would probably be "a wash."

In April IBM calculated Memorex's profit margins and concluded a 17% cut in prices would cause Memorex to lose money, regardless of its market share.

The Fixed Term Plan, Blecher reminded the jury, represented a 16% price cut by IBM on two-year leases.

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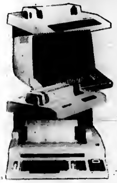

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Major Philadelphia Bank has a prime opening for a Systems Programmer at the Officer level. Position requires a minimum of 2 years experience in OS Assembly Language, OS/VS with knowledge of SMP and SYSGENS. VSAM or VTAM experience preferred. Duties include System Software planning, maintenance and modification. Excellent salary and benefits. Send resume including salary history to:

H. PRESTON
Personnel Division
PROVIDENT NATIONAL BANK
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Philadelphia, PA 19101
Equal Opportunity Employer

DATA PROCESSING OPENING

Manufacturing company in SW Ohio has opening for person with background of programmer/analyst and experience in 2 or more of —

RPG II
COBOL
DBMS "TOTAL"
IBM S/3-15 with CCP

Submit resume to: YELLOW SPRINGS INSTRUMENT CO., INC. Mrs. Naomi McKee, Per. Director P.O. Box 279 Yellow Springs, Ohio 45387

PROGRAMMER ANALYST

Duties include assisting faculty and students with instructional computing problems, improving library programs and documentation, and conducting user seminars. Preferred background includes master's degree; advanced knowledge of two of the following languages: Fortran, PL/I, Cobol, and Assembly; experience with a statistical package such as SPSS; previous academic computing experience; and familiarity with IBM 360/370 computers. Send resume, references and salary requirements to Marian Frobish, Computer Center Director, Holmes Hall, Bradley University, Peoria, Ill. 61625.

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Systems Analyst $18 to 22K
Real Time; Mfr. applications, Assembler/Fortran; Mini exp.

Systems Programmer $18 to $18K
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PROGRAMMER/ANALYST LIFE INSURANCE

Standard Insurance Company, a Portland, Oregon based life insurance company operating in ten western states, has an excellent opportunity for a programmer/analyst with 3 to 5 years experience in a life insurance company. The successful candidate should have a college degree, experience in programming 360's or 370's in COBOL or BAL, and have the ability to work with user departments. Experience in on-line systems or CFO would be desirable.

Submit resumes to Personnel Dept., Standard Insurance Company, P.O. Box 711, Portland, Oregon 97207.

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If you want to join the EDP professionals, send your resume and salary requirements to the address at the bottom of this ad. Please indicate on your response the name of the person listed at the location you choose. If you have a BS or MS in EE, Math, Physics, Computer Science or Engineering and do not see your area of work listed, we want to hear from you. Include geographic preference in your reply.

MICROELECTRONICS DIVISION
Miamisburg, Ohio

PROGRAMMER/ANALYST

- 3-4 years COBOL programming, preferably in manufacturing applications; FORTRAN knowledge helpful.
- Systems analysis and work with on-line techniques
- Graduate in Computer Science

Respond to T.F. Wade

COMMUNICATION SYSTEMS DIVISION
Columbia, South Carolina

SENIOR SYSTEMS ANALYSTS

- Design and develop basic software relating to microprocessors used in controllers, front-end systems and stand-alone computers
- 8080 assembler language, hardware background and operating systems helpful
- MS in EE, Math, Physics or Computer Science

SENIOR TEST DEVELOPMENT ENGINEER HARDWARE/SOFTWARE

- Develop software for characterization and evaluation of digital integrated circuits at device, card and systems level
- Fairchild Sentry 600/610 or Microdata, Xincom, Computest, Teradyne, Datatron or Tektronix experience
- BS in EE, Physics, Math or Computer Science

PROGRAMMER/ANALYST

- Design and develop basic software for microprocessors used in terminals, controllers, front-end systems and stand-alone computers
- Knowledge of communication systems desirable
- BS or MS in Computer Science, Math or Engineering

SENIOR COMPONENT ENGINEER

- Specification and evaluation of state-of-the-art MOS/LSI devices
- Thorough knowledge of device physics, application and test methods
- Testing memory, accelerated life test, environmental test methods, failure analysis and product application and process engineering.

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- Applications background in evaluation, development and support of 1800-9600 BPS modems
- Experience in state-of-the-art performance requirements, OEM chip sets and evaluation techniques
- EIA and CCITT interface and common carrier services knowledge

DIAGNOSTIC PROGRAMMER

- Design and develop basic software tools relating to microprocessors used in terminals, controllers front-end systems and stand-alone computers
- Knowledge of asynchronous and synchronous communications
- BS in EE, Math, Physics or Computer Science

Respond to D.C. Turner

TERMINAL SYSTEMS DIVISION
Ithaca, New York

SYSTEMS ANALYSTS AND PROGRAMMERS
For Development and Testing

- Communications: asynchronous and synchronous terminals, protocol, SDLC
- Knowledge of operating systems; peripheral drivers, file management, systems generator — knowledge of microprocessors a plus
- BS Computer Science or related degree plus 3-7 years experience

Respond to Michael A. Friedenberg

WORLDWIDE SERVICE PARTS CENTER
Atlanta, Georgia

SYSTEMS ANALYST

- DOS, COBOL and/or BAL (TOTAL or IMS preferred)
- Exposure to REAL-TIME PROCESSING
- College degree (or 5 years experience) and Programming Inventory Management, Warehousing and/or Distribution Systems experience

Respond to Chris Langley

TERMINAL SYSTEMS DIVISION
Millsboro, Delaware

PROGRAMMER/ANALYST

- COBOL, Assembler or NEAT/3 programming required
- Data base (particularly TOTAL) and on-line programming experience with Envron/1 or Intercomm
- Inventory control, WIP, MRP, and financial systems experience required

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- Minicomputer or microprocessor systems and/or associated application programming
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- Experience in Intel 8080 microprocessor beneficial

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- Structured programming and modular programming
- Specifying and evaluating systems architectures
- Microprocessor hardware and software knowledge necessary, as this lead position will involve communication with designers at all levels

ALL POSITIONS REQUIRE A BS IN EE OR CS WITH 0-5 YEARS EXPERIENCE.

Respond to Ron Tull

ALL REPLIES WILL BE HELD IN STRICTEST CONFIDENCE

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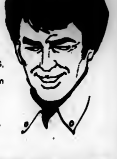

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Data Processing Careers, Inc
Suite 1109
Stemmons Tower West
Dallas, Texas 75207
DETROIT
Electronic Systems Personnel
1706 Fisher Building
Detroit, Michigan 48202
FLORIDA
Data Sciences Personnel, Inc
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15490 N W 7th Avenue
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801 Nicollet Mall, Suite 1716
Minneapolis, Minnesota 55402
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P O Box 8686
Greensboro, North Carolina 27405
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106 Lawyers Building
428 Forbes Avenue
Pittsburgh, Pennsylvania 15219

PROVIDENCE
Xavier Associates, Inc
10 Dorrance Street
Providence, Rhode Island 02903
SAN FRANCISCO
The Computer Resources Group Agency, Inc
303 Sacramento Street
San Francisco, California 94111
SYRACUSE
CFA Associates Personnel, Inc (Agency)
2530 James Street
Syracuse, New York 13206
TULSA
Data Processing Careers, Inc
Suite 10, Park 21 Building
2826 East 21st Street
Tulsa, Oklahoma 74114
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SYSTEMS ANALYST

Basic Timesharing, Inc., a leading California-based manufacturer of business computer systems, is looking for a capable analyst to provide in-depth technical support for sales activities in its Eastern Sales Region. Individual must have experience in applications programming, in BASIC and/or other languages, plus a sound grasp of computer operation, preferably interactive minicomputer systems. This is a good income, open opportunity with a fast-growing company. Call or write Sam Anson:

Basic Timesharing Inc.
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Cherry Hill, NJ . 08002
(609) 662-1122.

Executive and Technical Search Consultants

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Four Militia Drive
Lexington, Mass. 02173
[illegible]
(617) 861 6300

EDP Auditor

The Bendix Corporation, Executive Offices located in Southfield, Michigan has outstanding opportunities on its Corporate Internal Audit Staff.

Preferred candidates will have a degree and 2-5 years experience as an EDP Auditor or Systems Analyst. Extensive travel required. High visibility with management at all levels. Upward mobility into MIS a strong possibility.

Please submit resume, and salary history in complete confidence to George Giza, Bendix Corporation, Executive Offices, Southfield, Michigan 48076.

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New Hampshire Beckons

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Data Processing

PROGRAMMER
PROGRAMMER ANALYST

The American Bar Association, one of the largest organizations representing members of the legal profession, seeks data processing talent for broad responsibilities in its modern installation.

PROGRAMMER

Requires a minimum of 1-2 years of computer programming experience with demonstrated proficiency in COBOL and BAL Programming Languages in an IBM S/360 or S/370 computer environment. Demonstrated programming techniques of a complex nature essential. Combination of formal education and work-related training in the Data Processing field required.

PROGRAMMER ANALYST

Requires a minimum of 2-3 years systems analysis and computer programming experience in an IBM S/360 or S/370 computer environment. COBOL programming language essential. The successful candidate must possess excellent communication skills (oral and written). Principal responsibility will be for systems design and development of procedure documentation. Education and/or experience should be equivalent to a Bachelor's Degree in Data Processing, Accounting, or Business Administration.

Minority and women candidates are encouraged to respond.

We offer an excellent salary, total benefit coverage and advancement to increased responsibilities. Send resume in confidence including salary history to: **Ms. Betty Thomas Manager of Employment**

American Bar Association
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Chicago, IL 60637

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ELECTRONICS ENGINEER

Develop Industrial Solid State Controls

We're an international multi-plant leader in the design, development, and manufacture of high speed machinery for one of the largest industries in the nation. This career opportunity, in a northwest suburb of Chicago, seeks the talents of a BSEE with 5 years experience in the development of industrial solid state controls. A background in digital electronics and a knowledge of microprocessors or minicomputers is preferred.

You'll have complete project responsibility for the development of complex industrial control systems for automatic and semi-automatic machinery. Involvement will begin at the prototype stage and extend through first stage production including systems troubleshooting.

Excellent salary, generous benefits, and outstanding opportunities for advancement. For consideration send letter or resume, including salary history to:

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PROGRAMMER/ANALYST

An aggressive individual is needed in the design, programming, and continuing software enhancement of a minicomputer-based system which will be installed in several hundred business locations. Facets of this unusual system range from realtime processing to commercial applications concurrent within a single computer. Experience in minicomputer programming is a requirement. First consideration will be given to those who are:

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This $100 million company is located in the southeast. It still has a small management nucleus, and provides an unusually good working environment.

Contact Marvin Kliman collect at (803) 242-6101.

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PROGRAMMERS

STATE-OF-THE-ART shop needs above average OS COBOL programmers. Minimum 1 year experience. Degree desired IMS and/or CICS a plus. Company pays fee.

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A DOS/VS Shop utilizing CICS and implementing DL/1 on a IBM 370/145 COBOL Programmer with good background in BAL College background preferred. Minimum 1 to 2 years experience. Computer Science graduates will be considered. Salary dependent upon experience and education.

Contact Mr. Don O'Loughlin
Director, Data Management
The School Board of
Broward County, Florida
1320 S.W. 4th St.
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FINCL Systems-Cntrlrs div	$26K
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PROJECT MGR-Auto/comm-CFO	$21-24K
SYSTEMS Programmer-IMS, DL1, D.C.	$23-25K
PROG Anal-OS Fortran fincl applic.	$20-22K
PROG Anal-Pensions/trusts-Fortran	$15-20K
DOCUMENTATION Anal	$17-19K

Bill Borrelli (212) 349-3610
William Harris Associates
150 Broadway agency NY 10038

San Francisco Bay Area

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Progressive IBM 370/145 installation seeks a Computer Operations Manager. We are moving into an on-line Data Base/Data Communications environment. Experience in managing an on-line operations environment helpful. We offer an attractive Bay Area location, excellent benefits and competitive salaries. An E.O.E.

Please submit resume and salary history to:

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Newton, Mass. 02160

SENIOR PROGRAMMER-ANALYST CICS

Fortune 500 company is seeking an outstanding Programmer Analyst for leadership position in CICS application design, programming and implementation.

Candidate must have strong CICS application and programming experience. Excellent opportunity to grow with major MIS professional staff expansion.

Desirable Eastern city in sports/outdoor recreation region. Excellent compensation and fringe benefits package.

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equal opportunity employer M/F

SYSTEMS MANAGER

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Virginia Price
Personnel Director
SKCL SMITH KLINE CLINICAL LABORATORIES, INC.
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(301) 652-1182

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SYSTEMS ANALYST

requires some college plus at least 3 yrs. exp. in the design, development, and implementation of computer systems using COBOL, including at least one year as a lead worker.

PROGRAMMER

requires some college plus at least 2 yrs exp. programming in COBOL, including at least one year as a lead worker.

We offer a dynamic environment excellent salary and benefits. Call (213) 922-6314 for official applications, which must be returned by Friday, December 17th.

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Our Custom Software Group is seeking experienced programmers who enjoy close customer contact and software design and development in a profit oriented envrionment.

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Challenging opportunities available for experienced programmers in the area of software development, compiler design and implementation.

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These positions require considerable experience in programming and systems design, high intellectual capacity supplemented with in-depth experience with large systems, data base, and telecommunications.

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Should possess one to three years experience in Data Base maintenance programming utilizing IDS. Applicants with strong experience in IMS or DMS may be considered.

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Requires two years in teleprocessing activities utilizing H316/716 hardware with general knowledge of GECOS and working knowledge of TDS, GRTS, TSS, and NPS.

H6000 Lead Operators

Must have a minimum of two years experience on H6000 mainframe, preferably dual processors. Supervisory experience not required.

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Prior background in Honeywell software support Requires thorough knowledge of GCOS, GMAP and GRTS.

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Will direct the teleprocessing, telecommunications and systems software support activities of a large dual H6000 site. Desirable qualifications include a business or computer science degree plus five to eight years of Honeywell experience in all phases of related activities on large scale computers. Must have supervisory and administrative experience in work history.

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For immediate attention, please send resume
in complete confidence to

Bell Helicopter International

1901 Central Drive Bedford TX 76021

Bell Helicopter TEXTRON

An Equal Opportunity Employer M/F

SYSTEMS AND APPLICATIONS PROGRAMMERS

(Four-Phase or Incoterm)

and

COMMUNICATIONS ANALYST

Unusual opportunity to join a major user of S/370 and mini computer equipment.

SYSTEMS PROGRAMMERS — Positions require FOUR PHASE or INCOTERM experience, bisync software experience desirable.

APPLICATIONS PROGRAMMERS — Positions require COBOL experience with FOUR PHASE equipment, knowledge of RPG desirable.

COMMUNICATIONS ANALYST — Positions require network analysis experience with S/370, including a familiarity with TCAM and SNA.

Must be highly motivated data processing professionals with potential for growth into project management. Technical degree preferred.

Replies should state salary requirement and geographic preference. Primary openings in midwest major city. Positions will require some travel.

If you meet the above qualifications send your resume in confidence to:

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An Equal Opportunity Employer m/f

SYSTEMS PROGRAMMER OS/VS 2

UOP, a leading multi-national company in the energy and environmental fields, is searching for another top/flight systems programmer to join the present staff. We installed an MP-158 configuration. This is an exciting opportunity to work with the latest software (TSO and release 3 of OS/VS2) and to become a member of a truly professional staff of systems programmers.

We offer attractive salary and full benefits package. Send, resume or letter indicating salary requirements, to:

Al Kavaliauskas
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Des Plaines, IL 60016

An Equal Opportunity Employer M/F

INTERNATIONAL MIS FIELD SUPPORT SPECIALIST

Parlez-vous COBOL?

New York-based International Division of major consumer packaged goods company has an exceptional career opportunity for an experienced self-starter who can direct automation projects on a worldwide basis.

This position requires extensive travel. A typical project would be to spend 3-6 months in a foreign country assisting in new computer installations. That means you've got to be strong enough to carry out detailed assignments with minimum supervision, and tactful enough to achieve objectives smoothly in a staff supportive role. That's where your flair for foreign languages really helps.

You must have 2-4 years COBOL programming experience in an IBM commercial environment. Experience in RPG programming IBM System 3 Series computers and in analysis and design of business systems desirable.

For starters, a salary of $30K plus a superb opportunity to move up as you move about. Send confidential resume to:

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Programmer Analyst

Position available for an experienced Programmer Analyst. Opportunity to participate in the development of administrative systems in a sophisticated Medical Center environment.

Required experience includes a minimum of three years writing COBOL, exposure to assembly level languages, also participation in systems studies and design of administrative systems.

Additional desired experience would include teleprocessing systems, database management systems and exposure to HISI or GE computers.

Salary negotiable. Excellent fringe benefits. Submit resume to: Mr. Rudy Lienhard

Computer Services
Upstate Medical Center
750 East Adams Street
Syracuse, New York 13210
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Affirmative Action Employer

The Department of Computer and Information Science at Cleveland State University has a permanent position open at the Assistant Professor level starting September, 1977. Responsibilities include graduate and undergraduate teaching and research participation. Applicants should have a doctorate and teaching and research interest in applications to accounting and financial information systems or data base management systems. Inquiries and current vita should be directed to:

Dr. James D. Schoeffler, Chairmen
Department of Computer and
Information Science
Cleveland State University
Cleveland, Ohio 44115
(216) 687-4780
CSU is an Equal Opportunity/
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PROGRAMMER/ANALYST

Applicants with the following experience desired:

PDP-11 (RSTS/E)
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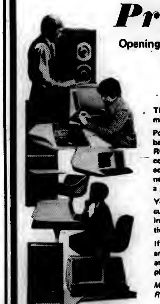

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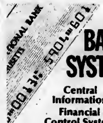

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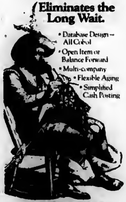

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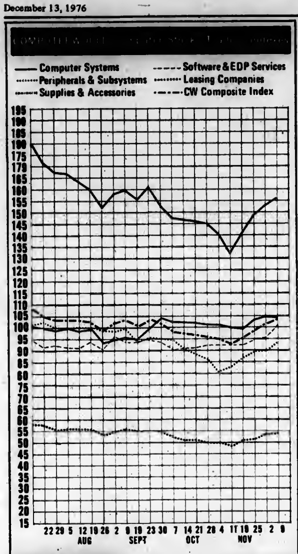

Earnings Reports

GENERAL SEMICONDUCTOR

Three Months Ended Aug. 31

	1976	1975
Shr Ernd	$.24	$.20
Revenue	1,334,493	1,029,268
Earnings	124,863	95,614
9 Mo Shr	.74	.59
Revenua	3,862,100	2,902,366
Earnings	368,150	a289,398

a-Includes $30,159 gain from sala of property.

GRAHAM MAGNETICS

Threa Months Ended Sept. 30

	1976	1975
Shr.Ernd	$.16	$.20
Revenua	3,964,463	3,728,361
Earnings	151,645	183,942

GRI

Four Months Ended Sept. 4

	1976	1975
Shr Ernd	.....	$.03
Ravenue	$16,260,000	16,667,000
Earnings	(50,000)	67,000
9 Mo Shr	.....	.74
Revenue	43,405,000	49,301,000
Earnings	(107,000)	1,863,000

HARRIS

Three Months Endad Sept. 30

	1976	1975
Shr Ernd	$1.20	$.94
Ravenua	128,770,000	118,660,000
Earnings	7,594,000	5,851,000

HAZELTINE

Three Months Ended Sept. 30

	1976	a1975
Shr Ernd	$.45	$.24
Revanue	21,705,000	22,663,000
Eemings	909,000	457,000
9 Mo Shr	2.90	.....
Ravenua	66,477,000	61,022,000
Tax Cred	1,050,000	.....
Earnings	b5,814,000	(908,000)

a-Includes $94,000 from investment sala. b-Includes $2,860,000 from settlement of contract claims with U.S. Air Force.

LEAR SIEGLER

Threa Months Ended Sept. 30

	1976 (000)	a1975 (000)
Shr Ernd	$.37	b.....
Revenua	171,474	$152,997
Eernings	6,061	3,954

a-Rastated. b-Antidilutive.

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Advartising Administrator
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Computerworld Stock Trading Summary

CLOSING RRICES WEDNESDAY, DECEMBER 8, 1976

All statistics compiled, computed and formatted by
TRADE*QUOTES, INC.
Cambridge, Mass. 02139

EXCH		RRICE			
		1976 RANGE (1)	CLOSE DEC 8 1976	WEEK NET CHNGE	WEEK RCT CHNGE
	CCNPUTER SYSTENS				
O	AMDANL CORR	23- 33	33	+3	+17.8
N	BURROUGHS CORP	84-108	RR 3/4	-1 3/R	-1.7
O	CCPRUTER AUTCNATION	10- 19	17 1/2	+1 1/4	+7.6
N	CONTROL DATA CORR	18- 27	23 1/2	+ 3/8	+2.7
N	OATA GENERAL CORP	40- 60	42 7/8	-4 3/8	-9.7
O	DATAROINT CORR	24- 46	31 1/2	+1	+3.2
O	DIGITAL CCNR CONTROL	2- 7	6 1/8	+ 1/8	+2.0
N	OIGITAL EQUIRNENT	46- 60	54 1/8	-2 3/8	-4.2
N	ELECTRONIC-ASSOC.	2- 3	2 1/R	0	0.0
A	ELECTRONIC ENGINEEP.	7- 16	8	- 3/8	-4.4
O	FOUR-RHASE SYSTENS	13- 21	16 3/8	+ 3/4	+4.7
N	FCXBCRO	28- 30	30 1/8	+2 1/4	+4.6
O	GENERAL AUTCNATION	4- 11	6	+ 1/2	+9.0
O	GRI CONRUTER CORP	1- 1	1/2	0	0.0
N	HEWLETT-RACKARD CO	80-117	87 7/8	-3 3/4	-6.1
N	NCNEYWELL INC	34- 36	46 3/4	+2 1/4	+5.0
N	IBM	227-2RR	272 3/4	+ 3/4	+0.2
O	NANAGENENT ASSIST	1- 8	8 3/8	+ 3/4	+9.8
O	HEMCREK	17- 33	21 1/4	+ 1/8	+0.3
O	MICRCOATA CCRR	10- 28	16 7/8	+ 7/8	+3.4
O	NODULAR CCNRUTER SYS	3- 14	3 1/8	+ 3/8	+13.8
N	NCR	24- 37	53 1/8	+ 1/8	+0.3
O	RRINE CONRUTER INC	4- 18	16 1/2	-1 1/4	-7.0
N	RERKIN-ELNER	19- 27	20 7/9	+ 1/R	+0.6
N	RAYTNEON CO	45- 67	61 3/4	+2 3/4	+4.6
N	SRERRY RAND	40- 32	43 3/4	- 3/4	-1.6
O	SYCOR INC	9- 31	13 1/2	+ 3/4	+3.8
A	SYSTENS ENG. LABS	5- 10	6 1/8	- 1/8	-2.0
N	VARIAN ASSOCIATES	12- 17	14 1/8	+ 1/8	+0.8
A	WANG LABS.	11- 20	15 1/8	+ 3/8	+2.5
	LEASING CCRRANIES				
O	9OOTNE COMRUTER CORR	1- 8	7 1/2	+ 1/8	+1.6
O	CCMUISCO INC	5- 10	9	- 1/4	-2.7
A	CCMMERCE GROUP CORR	2- 3	1 5/8	0	0.0
A	COMRUTER INVSTRS GRR	1- 3	1 7/8	+ 1/2	+36.3
N	OATRCNIC RENTAL	1- 8	1 1/R	0	0.0
A	DCL INC	1- 1	3/8	-	-9.1
N	DRR INC	5- 8	7 1/8	+ 1/2	+7.3
N	ITEL	6- 13	12 3/8	- 1/4	-1.9
N	LEASCC CORR	6- 20	19 1/2	- 1/2	-2.5
O	LEASPAC CORR	0- 1	1/8	0	0.0
O	NRG INC	0- 1	1/8	0	0.0
A	PICNEER 7ER CORR	6- 9	7 3/8	- 1/8	-1.6
N	U.S. LEASING	7- 12	9 7/R	+1 3/8	+19.6
	SOFTWAPE & EOR SERVICES				
O	ADVANCEC CCNP TECH	1- 3	1 1/4	+ 1/R	+11.1
O	ANACORR INC	6- 11	6 3/8	- 1/4	-3.7
A	ARPLIED DATA RES.	2- 3	4 3/8	+ 1/8	+2.7
N	AUTCNATIC CATA PROC	17- 33	30 5/8	+ 5/8	+1.2
O	COLEMAN AMERICAN COS	2- 6	2 3/8	+ 1/8	+3.5
O	CCMRU-SERV NETWORK	3- 10	R 1/2	+ 1/4	+3.0
O	CCNRUTER OIRENSIONS	3- 7	6 3/8	+ 1/8	+2.0
O	COMR ELECTICN SYSTMS	5- 9	3 1/2	+ 1/4	+4.7
O	CCNRUTER NORIZONS	1- 2	1 1/2	0	0.0
O	CCMRUTER NETWORK	2- 8	6 3/4	- 1/4	-3.5
N	CCMPUTER SCIENCES	4- 8	7 1/8	+ 3/R	+9.6
O	CCNRUTER TASK GROUR	1- 2	1 1/4	0	0.0
O	CCMPUTER USAGE	2- 6	2 1/2	0	0.0
O	CCMSHARE	2- 5	6	0	0.0
O	CATA DIMENSICNS INC	2- 4	3 7/8	+ 1/4	+6.8
O	DATATAB	1- 2	1 1/2	0	0.0
N	ELECTRCNIC CATA SYS.	12- 15	16 1/4	- 1/2	-2.9
O	INFORMATIONAL INC	1- 1	1/8	0	0.0
O	INSYTE CORR	1- 3	1 5/4	+ 1/4	+16.6
O	IRS CCNRUTER MARKET.	1- 2	1	0	0.0
O	KEANE ASSOCIATES	2- 4	2 1/2	+ 3/R	+17.6
O	KEYDATA CORR	1- 5	1 3/8	+ 3/8	+30.0
O	LOGICON	3- 8	7 1/2	+ 3/8	+3.2
A	MANAGEMENT CATA	1- 5	2	0	0.0
A	NATICNAL CSS INC	13- 23	20 3/4	+ 7/8	+4.4
O	NATICNAL OATA CORR	4- 7	4 3/4	- 1/R	-2.3
A	ON LINE SYSTENS INC	17- 23	22 7/8	+2 1/2	+12.2
N	PLANNING RESEARCH	3- 3	3 3/8	+ 1/8	+3.5
O	RRCGRAMNING & SYS	1- 1	1/4	0	0.0
O	RARIOATA INC	2- 3	2 1/8	+ 3/8	+21.4
O	REYNCLDS & REYNOLD	13- 21	17	+ 3/4	+4.6
O	SCIENTIRIC CCNRUTERS	1- 1	3/4	0	0.0
O	TYMSNAPE INC	14- 28	18 1/4	+1 1/4	+7.3
A	URS SYSTEMS	5- 5	3 7/R	+ 3/R	+10.7
N	WYLY CORR	1- 7	1 3/8	+ 1/8	+10.0
	REPIPNERALS & SUBSYSTENS				
N	AODRESSOGRAPH-MULT	8- 13	11 3/8	+ 3/4	+7.0
O	AOVANCED MEMCRY SYS	4- 10	7 3/R	+1 3/R	+27.0
N	AMREX CORR	5- 10	6 3/4	+ 1/8	+1.8
O	ANOERSCN JACCBSON	2- 4	2 3/4	- 1/8	-4.3
O	APRLIED OIG CATA SYS	13- 23	16 1/4	+ 1/4	+1.5
O	BEENIVE REOICAL ELEC	3- 10	9 5/8	+1	+11.3
A	BOLT,BERANEK & NEWN	7- 11	7 3/4	+ 1/4	+3.3
N	BUNKER-RAND	5- 10	7 3/8	+ 1/8	+1.7
A	CALCCMR	4- 7	4	- 1/2	-11.1
O	CAMBRIDGE MEMORIES	0- 6	3/R	- 1/8	-23.0
N	CENTRCNICS OATA COMR	20- 36	23 1/8	+ 1/8	+0.5
O	CODEX CORR	22- 42	33	+2 1/2	+8.1
O	CCGNITRCNICS	1- 1	7/8	0	0.0
O	CCMRUTER COMMUN.	1- 6	4 3/8	0	0.0
O	COMRUTER CONSOLES	4- 7	3 1/4	+ 1/4	+3.0
A	CCMRUTER EQUIPMENT	1- 3	1 3/8	- 1/8	-7.1
O	CCMRUTER TRANSCEIVER	1- 3	3/8	- 1/4	-28.5
O	CCMTEN	4- 9	8 3/R	+ 1/8	+1.4
H	CCNRAC CORR	20- 26	26 1/4	+3 1/4	+14.1
O	DATA ACCESS SYSTEMS	1- 3	4 1/4	- 3/4	-13.0
O	DATA 100	6- 13	6 3/4	- 1/8	-1.8
A	DATA PRODUCTS CORR	5- 15	12 1/4	+1	+R.R
O	OATA TECHNOLOGY	1- 2	1 7/8	- 1/8	-6.2
O	OATUM INC	1- 2	1	+ 1/8	+14.2
O	DECISICN DATA COMRUT	1- 4	1 5/R	- 1/R	-7.1
O	DELTA CATA SYSTENS	1- 1	1/2	0	0.0
N	ELECTRONIC R & M	1- 4	3 3/8	+ 1/8	+3.8
O	FAERI-TEK	1- 1	7/8	0	0.0
O	GENERAL CCNRUTER SYS	0- 2	1/4	- 1/8	-33.3
N	HAZELTINE CORP	4- 12	9 1/4	+ 3/4	+R.R
N	NARRIS CORR	34- 57	56 1/8	+2 3/8	+4.9
A	INCOTERN CORR	9- 20	14 1/2	+ 3/4	+5.4
O	INFCREX INC	3- 7	4 1/4	- 1/8	-2.8
O	INFORMATION INTL INC	10- 18	12	+ 3/8	+3.2
O	INTEL CORR	47-109	36	-3	-3.0
A	LUNDY ELECTRONICS	3- 7	3 7/8	0	0.0
O	NSI CATA CORR	3- 7	6 5/8	+ 3/8	+6.2
N	MILGC ELECTRONICS	15- 22	20 3/4	+ 1/4	+1.2
N	MOHAWK CATA SCI	3- 10	3 7/8	+ 1/2	+9.5
O	PERRIL CORR	1- 3	1 7/R	0	0.0
A	RERTEC CORR	3- 8	7 1/8	+ 5/8	+9.6
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	RRECISICN INST.	2- 10	2	0	0.0
O	QUANTOR CORR	4- 6	3 3/8	+ 3/8	+7.1
O	RECCCNITICN EQUIR	6- 11	9 1/2	+ 3/R	+4.1
N	SANDERS ASSOCIATES	6- 11	9 1/8	+ 3/4	+8.9
O	SCAN CATA	1- 4	1 1/8	-	-5.3
O	STCRAGE TECHNOLOGY	9- 13	11 5/R	+ 5/8	+3.6
O	T BAR INC	5- 10	6 3/8	+ 1/8	+2.0
O	TALLY CORR.	4- 6	4 3/4	- 1/2	-9.5
O	TEC INC	3- 9	9	+1 1/2	+20.0
N	TEKTRONIX INC	43- 69	62 1/2	-1	-1.3
N	TELER	2- 3	2 3/8	0	0.0
O	WANGCC INC	11- 22	18 1/2	-2 3/8	-12.4
O	WILTEK INC	2- 2	1/2	- 3/4	-60.0
	SURRLIES & ACCESSORIES				
O	ADVANCED SYSTEMS INC	1- 4	3 1/4	- 1/8	-3.7
O	BALTIMORE BUS FORMS	3- 5	3 3/8	- 1/8	-3.5
A	BARRY WRIGHT	6- 10	9 1/4	- 1/8	-1.3
O	CYBERRATICS INC	0- 1	1/2	0	0.0
A	OATA CCCUMENTS	25- 43	42 1/4	0	0.0
O	DUPLEX RRODUCTS INC	13- 24	13	+ 1/R	+0.9
H	ENNIS BUS. FORMS	6- 8	6	0	0.0
O	GRANAR MAGNETICS	8- 13	10 1/2	- 3/4	-6.6
O	GRARNIC CONTROLS	13- 19	15 1/4	- 1/4	-1.6
N	3R COMRANY	33- 66	53 1/4	-1	-1.7
O	MCCRE CORR LTD	32- 51	33	- 1/2	-1.4
N	NASHUA CORR	11- 19	18	0	0.0
O	STANDARO REGISTER	15- 19	17 1/2	+ 1/4	+1.4
O	TAB RRODUCTS CO	4- 11	10	+ 1/2	+3.2
N	UARCO	19- 23	20 3/8	+1	+3.1
A	WABASH MAGNETICS	4- 11	10 1/2	- 3/8	-3.6
N	WALLACE BUS FORMS	19- 23	21 3/4	- 1/R	-0.3

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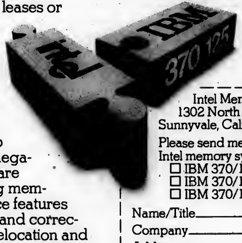

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